Product Catalog

Packaged Rooftop Air Conditioners IntelliPak™ 1

Including eFlex™ /eDrive™
Air-Cooled Condensers — 60 Hz
20 to 75 Tons, S*HL
90 to 130 Tons, S*HK

April 2021

RT-PRC036AB-EN

Introduction

Designed for Today and Beyond

Innovative technology and an impressive lineup of features make the Trane® IntelliPak™ rooftop line the number one choice for today and the future. The rooftop unit control modules (UCM) coordinates the actions of the IntelliPak™ rooftop for reliable and efficient operation and allows for standalone operation of the unit. Access to the unit controls, via a human interface panel, provides a high degree of control, superior monitoring capability, and unmatched diagnostic information.

For centralized building control on-site, or from a remote location, IntelliPak™ can be configured for direct communication with a Trane® Tracer® building management system or a third party LonTalk® or BACnet® building management system, using a twisted pair of wires. Trane also has Air-Fi® Wireless, a state of the art communication platform that minimizes installation time, material, and risk. With any of these optional systems, the IntelliPak™ status data and control adjustment features can be conveniently monitored from a central location. IntelliPak™ has the technology and flexibility to bring total comfort to every building space. AHRI certifies up to 63 ton units, all air-cooled units over 63 tons are tested in accordance with the code. The applications in this catalog specifically excluded from the AHRI certification program are ventilation modes, heat recovery, and evaporative condensing.

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Revision History

- Updated the Model Number Description chapter.
- Miscellaneous edits.

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Features and Benefits

Standard Features

- 20 to 130 ton industrial/ commercial rooftops
- R-410A refrigerant
- ASHRAE 90.1 - 2016 efficiency compliant
- cULus approval on standard options

Controls

- Fully integrated, factory-installed/commissioned microelectronic controls
- Unit-mounted human interface panel
- Low ambient compressor lockout control on units with economizers
- Frostat™ coil frost protection
- Daytime warm-up (occupied mode) on VAV models and morning warm-up operation on all units with heating options
- Supply air static over-pressurization protection on units with VFDs
- Return air static over-pressurization protection on units with return fan option
- Supply airflow proving
- Exhaust/return airflow proving on units with exhaust/return option
- Supply air tempering control
- Supply air heating control on CV or VAV units with discharge temp control modulating gas, hot water or steam heat units
- Mappable sensors and setpoint sources
- Occupied/unoccupied switching
- Emergency stop input
- Low charge protection
- Dirty filter switch
- Phase monitor (20 to 75 ton)
- Humidification input
- Freeze avoidance

Refrigeration

- Trane® 3-D® scroll compressors
- Compressor or circuit lead/lag depending on unit
- Intertwined evaporator coil circuiting for full face area operation at part load conditions
- Microchannel condenser coil
- Discharge service valves

Cabinet

- Hinged access doors on control panel, filter section, and gas heat section
- Pitched roof over air handler section
- Heavy-gauge, single-piece construction base rails
- Meets salt spray testing in accordance to ASTM B117 Standard

Mechanical

- Forward-curved supply fans (20 to 75 ton)

- Airfoil supply fans (90 to 130 ton)
- Stainless steel flue stack on gas heat units
- Two-inch high efficiency throwaway filters

Optional Features

For a comprehensive listing of standard options, special options, and accessories, see "Options," p. 149.

Controls

- Trane® communication interface module: ICS interface control module
- LonTalk® communication interface module
- BACnet® communication interface module
- Remote human interface panel (controls up to four units)
- Five ventilation override sequences
- Generic BAS interface 0-5 VDC and 0-10 VDC
- Variable frequency drive control of supply/exhaust/return fan motor
- Rapid restart
- High duct temperature thermostats pressurization control
- 0°F low ambient control
- Power supply monitoring (90 to 130 ton)
- Correction capacitors
- Economizer fault detection and diagnostics (FDD) control with ultra low leak economizers

Refrigeration

- eFlex™ variable speed compressor (40 to 75 ton)
- Hot gas bypass to the evaporator inlet
- Modulating hot gas reheat
- Suction service valves
- Replaceable core filter driers
- High capacity options via compressor and/or coils
- High efficiency options via supply fan and/or coils
- Corrosion protected condenser and/or evaporator coil

Cabinet

- Extended casing (SX models)
- Double wall construction with access doors
- Stainless steel drain pan in evaporator section
- Horizontal Supply and Exhaust/Return on certain configurations
- IntelliPak™ replacement unit (IRU)
- Special paint colors
- IBC Compliance in certain configurations.

Mechanical

- eDrive™ direct drive plenum supply fans; 80%, 100%, or 120% wheel width (20 to 75 tons)
- Supply fan piezometer for direct drive plenum airflow measurement
- Outside air CFM compensation on VAV units with VFD and economizer

- Barometric relief
- 0-100 percent modulating outside air economizer
- Low leak, and Title 24-rated ultra low leak 0-100 percent modulating outside air economizer
- Ultra low leak power exhaust dampers
- Comparative enthalpy, reference enthalpy or dry bulb economizer control
- Trane® outside air measurement (Traq™)
- 50 or 100 percent modulating exhaust with forward-curved fans
- 100 percent modulating return with airfoil fans
- Statitrac™ direct space sensing building pressurization control on 100 perfect exhaust/return
- Two-inch spring fan isolation
- Motors with internal shaft grounding ring for VFD applications

Filtration

- Filter rack only (no filters)
- High efficiency throwaway filters, MERV 8
- 90 to 95 percent bag filters, MERV 14
- 90 to 95 percent cartridge filters, MERV 14
- Final filters, cartridge filters, MERV 14
- Differential pressure gauge
- Final filter rack only (no filters)

Heat

- Heating options: natural gas, electric, hot water, or steam
- Modulating gas heat, 4:1 or ultra
- 10 year limited warranty on 4:1 and ultra modulating gas heat

Electrical

- Dual electrical power connection
- Through the door non-fused disconnect with external handle
- Electrical convenience outlet
- High Fault SCCR

Field-Installed Accessories

- Roof curbs
- Programmable sensors with night set back - CV and VAV
- Sensors without night set back - CV and VAV
- Remote zone sensors - used for remote sensing with remote panels.
- ICS zone sensors used with Tracer® system for zone control
- Outdoor temperature sensor for units without economizers
- Remote minimum position control for economizer
- Field-installed module kits available for field upgrade of controls
- Humidity sensor
- BCI and LCI communication boards
- Air-Fi® Wireless (WCI)

Features Summary

IntelliPak™ rooftop features make installation and servicing easy — and reliable operation a reality.

Installation and Service Ease

- Factory-installed/commissioned controls
  - ease of startup
  - single twisted wire pair
  - communication for ICS interface
  - full unit points access, no field wiring of required points
- Unit-mounted lifting lugs facilitate installation and can be used as unit tie-down points
- The microprocessor unit controls coordinates the operation of the rooftop with quality, industry-accepted components for service ease
- Unit-mounted human interface panel standard
  - user friendly keypad - edit parameters
  - through the access door interface
  - startup adjustments
  - unit-mounted and remote interface panel key pads are identical
- Modularity of unit control design
  - individual replaceable functional boards
- Advanced diagnostics
- Sloped drain pan for water removal in the evaporator section
- Belt-less Direct Drive Plenum Supply Fan removes dust particles, reducing wear on filters
- Extended Grease lines on forward-curved fan shaft bearings
- Hinged access on the control panel as well as the filter, supply fan, exhaust/ return fan, and the heating sections

Reliability

- Advanced diagnostics
- Microprocessor controls
- Built-in safeties
- cULus approval as standard
- Factory balanced, forward-curved supply and exhaust fans and airfoil supply and return fans
- Corrosion protected condenser coil provides durability and defense against the destructive effects of alkalies, acids, alcohols, petroleum, seawater, salt air, and corrosive environments
- Internal Shaft Grounding Ring for motor bearing protection
- High fault unit interrupt rating (Short Circuit Current Rating-SCCR) up to 65k
- Fully insulated and gasketed panels reduce ambient air infiltration
- Standard with Frostat™ on all units as well as freeze avoidance on hydronic heat units
- 200,000 hour average fan shaft and motor bearings
- Gas heater with free-floating stainless steel heat exchanger relieves stresses of expansion and contraction, stainless steel provides corrosion resistance through the entire material thickness
- Integral condenser subcooler improves efficiency while helping avoid liquid flashing
- Factory-wired and commissioned controls assure efficient and reliable rooftop operation
- Trane® Scroll compressors designed to meet demanding operating conditions both in efficiency and reliability

- Phase monitors for compressor protection
- Roll-formed construction enhances cabinet integrity and assures a leak proof casing
- Three-phase, direct-drive condenser fan motors
- Ultra low leak economizer standard with 5-year limited warranty and functional life of 60,000 opening and closed cycles.
- Long-lasting, extremely durable, corrosive-resistant stainless steel sloped drain pans minimize deterioration resulting in premature leakage.

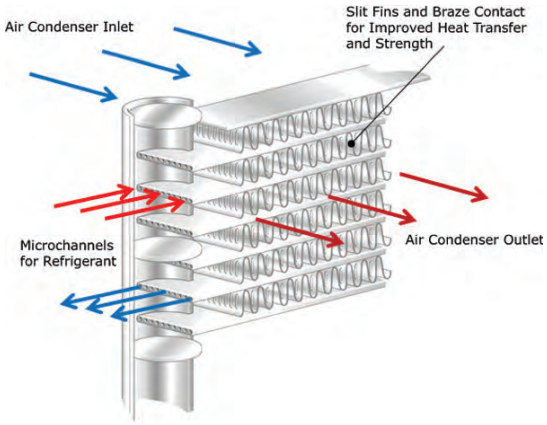
Application Flexibility

- Modularity in design
- Variable speed compressors are designed to modulate refrigerant flow achieving outstanding part load ratings (IEER)
- Horizontal supply and exhaust/return airflow options
- Generic BAS interface
- Five factory preset/re-definable in the field ventilation override sequences
- Superior Tracer® interface for ICS applications
- Superior LonTalk® interface for Tracer® and 3rd party applications
- Superior BACnet® interface for Tracer® SC or 3rd party applications
  - Field-installed Wireless Comm through BCI add available
- Unit-mounted or remote human interface panels
  - all parameters can be edited from the human interface panel
- Multiple supply fan options to meet specific application needs
- Exhaust or return fan options available for building pressure control
- Low ambient cooling available to 0°F
- Traq™ outside air measurement to meet LEED IEQ Credit 1
- Comparative enthalpy, reference enthalpy, or dry bulb control for economizers
- Statitrac™ direct space building pressure control
- Compensated outdoor air control - IAQ
- CV controls stage both compressors and heat based on space requirements.
- Variable frequency drives (VFD) included with or without bypass control for supply and exhaust/return fans.
- Comfort cooling control with modulating hot gas reheat

Microchannel Condenser Coil

Microchannel condensing coils are all-aluminum coils with fully-brazed construction. This design reduces risk of leaks and provides increased coil rigidity — making them more rugged on the jobsite. Their flat streamlined tubes with small ports and metallurgical tube-to-fin bond allow for exceptional heat transfer. Microchannel all-aluminum construction provides several additional benefits:

- Light weight (simplifies coil handling)
- Easy to recycle
- Minimize galvanic corrosion



Energy Savings, Improved IAQ and Comfort

IntelliPak offers several ways to save energy while improving indoor air quality (IAQ) and zone comfort. Standard factory installed options for energy savings include, but are not limited to, modulating hot gas reheat, eDrive™ Direct Drive Plenum Supply Fans and eFlex™ variable speed compressors.

Single Zone VAV (SZVAV)

Single Zone VAV (SZVAV) is designed for use in single zone applications such as gymnasiums, auditoriums, manufacturing facilities, retail box stores, and any large open spaces where there is a diversity in the load profile. It is an ideal replacement to "yesterday's" constant-volume (CV) systems, as it reduces operating costs while improving occupant comfort.

SZVAV systems combine Trane application, control and system integration knowledge to exactly match fan speed with cooling and heating loads, regardless of the operating condition. Trane algorithms meet and/or exceed ASHRAE 90.1 SZVAV energy-saving recommendations and those of CA Title 24. The result is an optimized balance between zone temperature control and system energy savings. Depending on your specific application, energy savings can be as much as 20+%.

Note: *Building system modeling in energy simulation software such as TRACE is recommended to evaluate performance improvements for your application.*

SZVAV is fully integrated into the control system. It provides the simplest and fastest commissioning in the industry through proven factory-installed, wired, and tested system controllers. All control modules, logic boards and sensors are factory installed and tested to ensure the highest quality and most reliable system available. This means no special programming of algorithms, or hunting at the jobsite for field installed sensors, boards, etc. SZVAV is a quick and simple solution for many applications and is available from your most trusted rooftop VAV system solution provider -Trane.

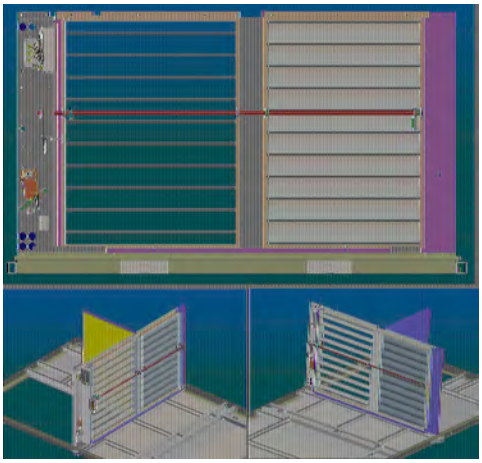
eDrive™ Direct-Drive Plenum Fans

In addition to higher reliability, direct-drive plenum fans offer higher fan efficiency at AHRI rating points. Direct drive plenum fans have a peak operating efficiency which is typically 10-20% more efficiency than traditional housed fans. Trane's belt-less Direct Drive Plenum design allows for less maintenance by requiring no bearing lubrication, and eliminating belt particles clogging the filters. Trane offers two fan widths to optimize fan efficiency for the building system. For low static applications, where forward-curved fans may be the best choice, use Trane's TOPSS™ computer software selection program to select the most efficient fan option for your system design.

Figure 1. eDrive™ direct-drive plenum fan

Ultra Low Leak, AMCA 1A Damper

Figure 2. Ultra low leak economizer



The Ultra Low Leak AMCA 1A Economizer Damper package will meet or exceed requirements of California Title 24, ASHRAE 90.1, and IECC. The economizer, including linkages and actuators, will have a 5 year limited warranty and functional life of 60,000 opening and closed cycles.

Dampers are AMCA 511 Class 1A certified with a maximum leakage rate of 3 CFM/sq-ft at 1.0 in. WC pressure differential. As part of this option, Fault Detection and Diagnostics (FDD) control is included to meet California requirements. FDD control monitors the commanded position of the economizer compared to the feedback position of the damper. If the damper position is outside of ±10% of the commanded position, a diagnostic is generated.

Ultra low leak power exhaust dampers are also provided on exhaust options that include motorized exhaust dampers when the ultra low leak economizer is ordered.

High Efficiency Unit

This option offers improved unit efficiency. All high-efficiency units meet CEE Tier 2 requirements for unitary equipment. This allows opportunities for owners to take advantage of valuable utility rebates for using energy-efficient equipment.

Trane® Air Quality (Traq™) Outside Air Measurement System

Trane® Air Quality (Traq™) outside air measurement system uses velocity pressure sensing rings to measure airflow in the outside air opening from 40 cfm/ton to maximum airflow. Traq™ dampers are AMCA certified (+/- 5.0%) from 300fpm to 2500fpm, meeting requirements of LEED IE Q Credit 1.

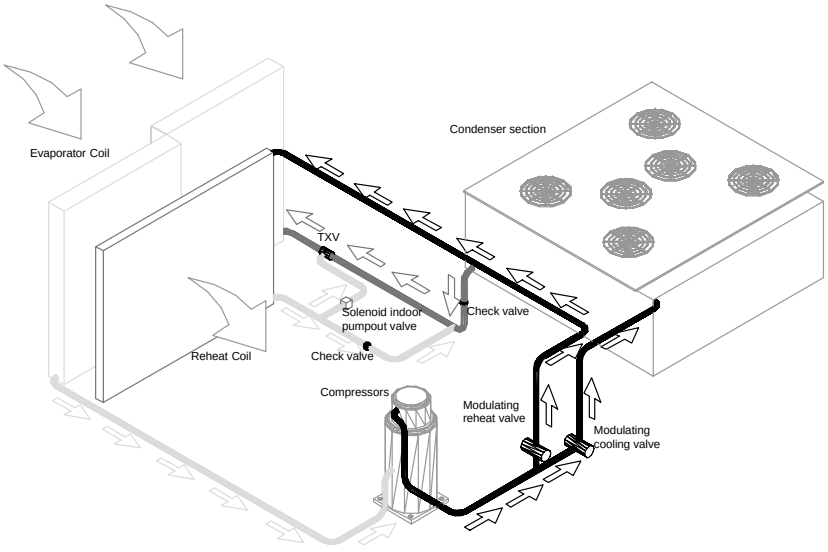
eFlex™ Variable Speed Scroll Compressor

Trane® eFlex™ variable speed scroll compressors are matched with a specially designed variable frequency drive that allows a modulating ratio of up to 4:1. Our eFlex™ compressors are paired with fixed speed compressors such that the units are capable of continuous capacity modulation from 15 to 100%. By design, unit capacity stages overlap to eliminate the frequent cycling between stages typical of competing designs. This allows for unmatched control of leaving air temperatures to meet space loads. The eFlex™ compressors also include brushless permanent magnet motors designed to operate at higher efficiency along with reducing the compressor motor speed and staging results in significant part load energy savings. This makes units with eFlex™ compressors the most efficient products in their class at part load.

Modulating Hot Gas Reheat

By its very nature, the colder the air, the less moisture it contains. With hot gas reheat, hot refrigerant gas leaving the compressor is diverted to a hot gas reheat coil. The cold air leaving the DX coil is then reheated to an acceptable temperature and returned as dehumidified air to the facility space. The modulation of the hot gas reheat helps maintain both temperature and humidity levels in cooling mode, while reducing unit operating costs and saving energy.

Figure 3. Hot gas reheat



Stainless Steel Sloped Drain Pans

The non-porous, stainless steel surface on these drain pans avoids the harboring of dirt and bacteria, while discouraging microbial growth and helping to promote indoor air quality. The material is easy to clean, long lasting, and extremely durable—all of which minimize drain pan deterioration, which can result in premature leakage. The stainless steel drain pans are sloped to both sides of the IntelliPak unit base rail, allowing for easy and fast water exit.

Optimum Building Comfort Control

The modular control design of the UCM allows for greater application flexibility. Customers can order exactly the options required for the job, rather than one large control package. Unit features are distributed among multiple field replaceable printed circuit boards. The Trane UCM can be setup to operate under one of three control applications:

- Standalone
- Interface with Trane Tracer building management system
- Interface with a generic (non-Trane) building management system. All setup parameters are preset from the factory, requiring less start-up time during installation

The unit mounted Human Interface and the Remote Human Interface Panels allow for less time spent servicing due to easy to read diagnostics and control adjustments made off of the roof.

All rooftop control parameters are adjustable and can be setup through the Remote Human Interface Panel such as, but not limited to: system on/off, demand limiting type, night setback setpoints, and many other setpoints. No potentiometers are required for setpoint adjustment; all adjustments are done through the Remote Human Interface keypad.

Up to 56 different rooftop diagnostic points can be monitored through the human interfaces such as: sensor failures, loss of supply airflow, and compressor trip. No special tools are required for servicing the unit. All diagnostic displays are available at the Remote Human Interface and will be held in memory, so that the operator/service person can diagnose the root cause of failures.

Statitrac Direct Space Building Pressurization Control

Figure 4. Statitrac

Trane Statitrac control is a highly accurate and efficient method of maintaining building pressure control with a large rooftop air conditioner.

Building space pressurization control is achieved with a 100 percent modulating exhaust system that features a single forward curved fan, with modulating discharge dampers that operates only when needed or a 100% modulating plenum return fan with airfoil wheel that operates continuously with the supply fan. Most of the operating hours of the 100 percent modulating exhaust system are at part load, resulting in energy savings. Statitrac, with the 100 percent modulating exhaust system, provides comfort and economy for buildings with large rooftop air conditioning systems. Statitrac, with the 100% modulating plenum return fan provides comfort and space pressure control in more demanding applications with high return static pressure, and applications requiring duct returns.

Statitrac control with exhaust fan is simple! The space pressure control turns the exhaust fans on and off as required and modulates exhaust dampers, or fan speed, to maintain space pressure within the space pressure deadband. Economizer and return air dampers are modulated based on ventilation control and economizer cooling request.

The unit mounted Human Interface Panelcan be used to:

- Adjust space pressure setpoint
- Adjust space pressure deadband
- Measure and read building static pressure

The modulating exhaust system maintains the desired building pressure, while saving energy and keeping the building at the right pressure. Proper building pressurization eliminates annoying door whistling, doors standing open, and odors from other zones. The Statitrac direct space building control sequence will also be maintained when a variable frequency drive is used.

Statitrac Control with Plenum Return Fan

Other manufacturers utilize a fan tracking control scheme whereby the return fan speed tracks the supply fan speed in a linear fashion. This scheme works well at minimum and maximum CFM airflow. However, due to the dissimilar performance characteristics of the supply and return fan, building pressure is difficult to control at points between minimum and maximum CFM airflow.

The Trane return fan/building pressurization control system eliminates the effects of dissimilar supply/return fan characteristics experienced in a linear tracking control system by modulating the exhaust dampers based on space pressure, the return/economizer dampers based on ventilation requirements, and the return fan speed based on return plenum static pressure. The supply fan, return fan, exhaust damper, and return/economizer damper systems act independently from one another to maintain comfort and building pressure.

The return fan operates whenever the supply fan is in operation. The unit exhaust dampers are modulated in response to the space pressure signal to maintain space pressure within the space pressure deadband. The unit economizer and return air dampers are modulated based on ventilation control, minimum outside air economizer position, and economizer cooling request. The return fan speed is modulated based on a return duct static pressure deadband control. Using the unit mounted Human Interface, the operator can:

- Adjust space pressure setpoint
- Adjust space pressure deadband
- Measure and read building space pressure
- Measure and read return duct static pressure.

Proper building pressurization eliminates annoying door whistling, doors standing open, and odors from other zones.

Variable Frequency Drives (VFD)

Variable Frequency Drives are factory installed and tested to provide supply/exhaust/return fan motor speed modulation. VFD's, as compared to discharge dampers, are quieter, more efficient, and may be eligible for utility rebates. The VFD's are available with or without a bypass option. Bypass control will simply provide full nominal airflow in the event of drive failure. Further motor reliability is added with the optional Internal Shaft Grounding Ring.

3-D Scroll Compressors

The Trane 3-D® Scroll provides important reliability and efficiency benefits inherent to its design. The 3-D Scroll allows the orbiting scrolls to touch in all three dimensions forming a completely enclosed compression chamber which leads to increased efficiency.

In addition, the orbiting scrolls only touch with enough force to create a seal, thereby resulting in no wear between the scroll involutes. The fixed and orbiting scrolls are made of high strength cast iron, which results in less thermal distortion and minimal leakage. In addition, better part isolation has resulted in reduced compressor sound levels compared to previous designs.

Figure 5. 3-D® scroll compressor

Features listed below optimize the compressor design and performance:

- Optimized scroll profile
- Heat shield protection to reduce heat transfer between discharge and suction gas
- Suction Gas Cooled Motor
- Low Torque Variation
- Improved sealing between condenser side and air handler side

Additional features are incorporated in the compressor design for greater compressor reliability:

- Patented design motor cap for improved motor cooling
- Improved bearing alignment
- Improved resistance to dry start up
- Oil sight glass for evaluating proper oil levels

Low Torque Variation

The 3-D scroll compressor has a very smooth compression cycle. This means that the scroll compressor imposes very little stress on the motor resulting in greater reliability. Low torque variation reduces noise and vibration.

Suction Gas Cooled Motor

Compressor motor efficiency and reliability is further optimized with the latest scroll design. The patented motor cap directs suction gas over the motor resulting in cooler motor temperatures for longer life and better efficiency.

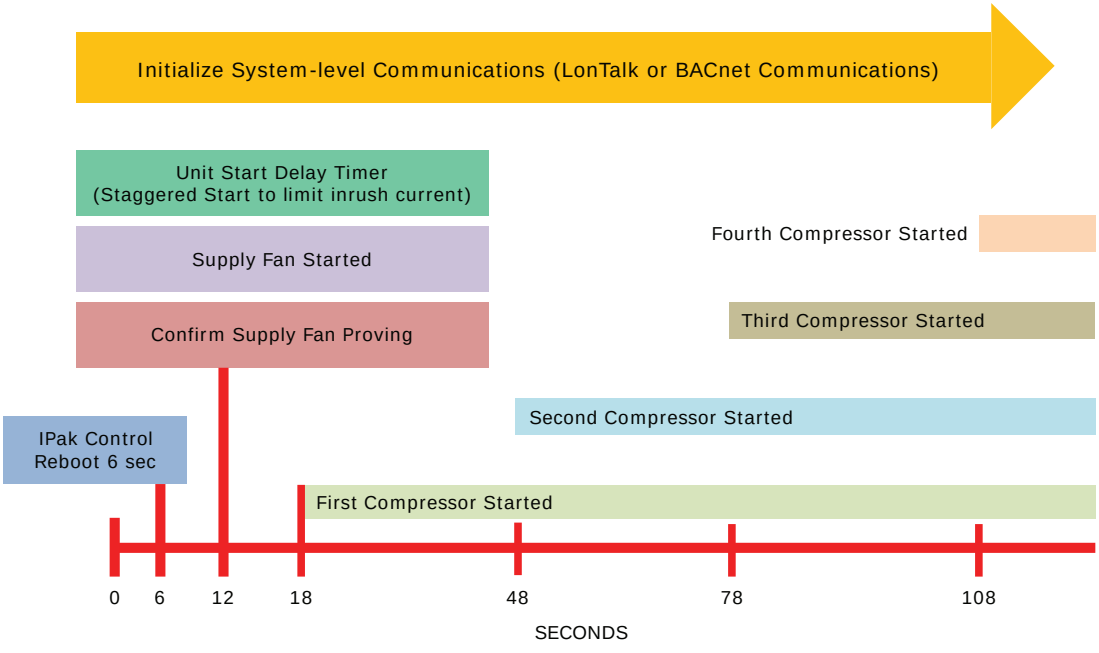
Rapid Restart

Trane understands that every second counts. Trane equipment, controls, and control sequences are designed to get the system back online and properly functioning should the facility experience a power cycle event.

- Trane HVAC system design is optimized for fast restart.
- IntelliPak Rooftop System controls and equipment provide an integrated, pre-engineered solution for fast restart.
- Proven operational procedures maximize uptime outside of critical outages and get the system up and running as quickly as possible.

With Rapid Restart and use of a backup generator, the IntelliPak™ Rooftop System can provide full cooling in 120 seconds or less after regaining electrical power. This option is fully integrated into the IntelliPak controls logic via standard human interface. Rapid Restart is a perfect fit in time-sensitive applications where extended down time is not an option and heating/cooling is crucial.

Figure 6. Rapid restart



Ultra Modulating Gas Heat

The Ultra-Modulating Gas Heat option uses an increased turn-down ratio to offer precise temperature control in heating applications. The ultra modulating turn down ratios are 14 to 1 for

500 Mbh, 18 to 1 for 850 Mbh, and 21 to 1 for 1000 Mbh, and are available in both low and high heat. For specific unit heating inputs, please reference the General Data section.

Integrated Rooftop Systems: Profitable, Simple

Trane® integrated rooftop systems make design and installation of building management systems cost effective and easy. Trane offers three choices for building management controls: Tracer® building automation system with a Trane® Control Interface (TCI), LonTalk® Communication Interface (LCI) or Tracer® SC with BACnet® Communication Interface (BCI).

The Tracer TCI Integrated Comfort™ System (ICS) improves job profit and increases job control by combining Trane rooftop units with the Trane Tracer building management system. These integrated systems provide total building comfort and control. Some of the primary motivations for building owners/managers in deciding to purchase a HVAC controls system are energy savings, cost control, and the convenience of facility automation.

Integrated Comfort with LonTalk Communication

Trane® Tracer® LonTalk® Control Interface (LCI) for IntelliPak offers a building automation control system with outstanding interoperability benefits.

LonTalk, which is an industry standard, is an open, secure and reliable network communication protocol for controls, created by Echelon Corporation and adopted by the LonMark® Interoperability Association. It has been adopted by several standards, such as: EIA-709.1, the Electronic Industries Alliance (EIA) Control Network Protocol Specification and ANSI/ASHRAE 135, part of the American Society of Heating, Refrigeration, and Air Conditioning Engineer's BACnet® control standard for buildings.

Interoperability allows application or project engineers to specify the best products of a given type, rather than one individual supplier's entire system. It reduces product training and installation costs by standardizing communications across products. Interoperable systems allow building managers to monitor and control IntelliPak equipment with a Trane Tracer Summit or a 3rd party building automation system. It enables integration with many different building controls such as access/intrusion monitoring, lighting, fire and smoke devices, energy management, and a wide variety of sensors (temperature, pressure, light, humidity, occupancy, CO_2 and air velocity). For more information on LonMark, visit www.lonmark.org or Echelon, www.echelon.com.

Integrated Comfort with BACnet Communication

The Trane SC BACnet Control Interface (BCI-I) for IntelliPak offers a building automation control system with outstanding interoperability benefits. BACnet, which is an industry standard, is an open, secure and reliable network communication protocol for controls, created by American Society of Heating, refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE)

Interoperability allows application or project engineers to specify the best products of a given type, rather than one individual supplier's entire system. It reduces product training and installation costs by standardizing communications across products. Interoperable systems allow building managers to monitor and control IntelliPak equipment with Tracer SC or a 3rd party building automation system. It enables integration with many different building controls such as access/intrusion monitoring, lighting, fire and smoke devices, energy management, and a wide variety of sensors (temperature, pressure, light, humidity, occupancy, CO_2 and air velocity).

Diagnostic Points	Control Points	Setup and Configuration
All self-contained unit diagnostics	Cooling and heating setpoints	Supply fan mode
System setpoints	Zone setpoint offsets	Configuration of supply air reset
System sensor inputs	VAV discharge air setpoints	Ventilation override mode configuration
Supply fan mode and status	Supply air pressure setpoint	Default system setpoint values
VFD speed	Space pressure setpoint	Sensor calibration offsets
Unit heat/cool mode	Zone and outdoor temperature values	

Diagnostic Points	Control Points	Setup and Configuration
Economizer position & setpoints	Cooling and heating enable/disable	
On/off status of each compressor	Economizer enable/disable	
Evaporator and saturated condenser temps	Economizer setpoint	
Hydronic heat valve position	Economizer minimum position	
Electric heat stage status	Activation of ventilation override modes	
Ventilation override mode status	Diagnostics reset	
	Unit priority shutdown	
	Timed override activation	

Trane Air-Fi® Wireless Communication

Trane Air-Fi® Wireless replaces the need for wired building controls, allowing installations to be completed quickly with less disruption to occupants in existing buildings, while also providing greater reliability, simplified installation and more flexibility as building spaces change. Many building owners face challenges connected to maintenance and repair with traditional wired systems, which fail when wires are cut or disconnected or fail intermittently when damaged. Air-Fi Wireless can help optimize any building's performance with less risk, thanks to self-repairing mesh technology that features redundant signal paths to help prevent communication failures.

Trane offers a typical 200-foot indoor signal range, with up to four times the number of paths, extending up to half-mile when unobstructed for even greater levels of signal reliability. With a battery life that's three times what competitors offer, the lifetime battery[1] eliminates the need to replace batteries over the life of the system in most installations and saves time and money. Air-Fi Wireless is a ZigBee® Certified Building Automation solution, and the system is built on a platform that supports BACnet® open standards. This allows customers to integrate devices in the future when the building expands or changes. Wireless sensors are easy to move or replace, as needed, to resolve issues related to sensing accuracy, aesthetics or reconfigured spaces.

Trane Air-Fi Wireless also conforms to the IEEE 802.15.4 standard, so customers get a wireless BAS communication system that reliably coexists with other wireless systems, including Bluetooth® and Wi-Fi® — without interference. There's no security risk with Air-Fi Wireless, which uses a separate, secure network from those used by a building's IT system. Air-Fi Wireless secures building automation networks by the use of AES-128 encryption, keys and device authentication.

The Trane Air-Fi Wireless interface is available factory-installed and addressed as a design special to expedite installation and reduce labor and upfront costs. It also ensures higher installation quality that results in better building performance for customers because the work is done in a controlled environment, making it more repeatable and consistent. To learn more about Trane Air-Fi Wireless technology, visit www.trane.com.

1. *Based on typical indoor operating conditions.*

Controls

Rapid Restart (RR) Only

The IntelliPak™ controls platform will support rapid restart unit startup after every power cycle occurs. There will be no assumptions about how long the unit has been OFF, so the unit will perform the same startup sequence with each occurrence.

The following is a list of the control operations:

- This is a cooling only function and will not function with heating.
- RR will target a four-minute maximum time from start signal to 100% cooling with an upper limit of five minutes.
- Outside air temperatures relative to the Low Ambient Lockout Setpoint will determine whether economizer cooling or DX staging will be the primary source for cooling.
- The use of economizing below low ambient lockout (typically 50°F) during the RR function will be a selectable option on the HI.
- Until the RR termination conditions are met, the unit will ramp the outside air damper open, if under economizer operation. Until the RR termination conditions are met, the unit will stage DX mechanical cooling, if available, at six second intervals.
- Supply fan capacity will increase accordingly: CV and SZVAV: Supply fan operation at full airflow will be utilized.
- VAV: Once the supply fan proving switch is closed, the supply fan speed will ramp to 50% command, then control to normal discharge static pressure control limited by the high duct static limit.
- Building pressure will always be in control.
- The unit will indicate via local HI and remote BAS that the RR event is active.
- Valid RR temperature sensor or return air temperature sensor is required to determine initialization and deactivation of RR relative to RR critical temperature setpoint. If this sensor fails, the unit will terminate RR when the discharge temperature sensor indicates a value below the active SA cooling setpoint – 1/2 deadband.
- Limit OA humidity infiltration to humidity greater than 20% RH.

Variable Air Volume (VAV) Only

Note: *When noted in this sequence "Human Interface Panel," the reference is to both the unit mounted and remote mounted Human Interface Panel. All setpoint adjustments can be accomplished at the unit or Remote Human Interface Panel.*

Supply Air Pressure Control

Variable Frequency Drive (VFD) Control

Variable frequency drives are driven by a modulating 0-10 VDC signal from the Rooftop Module (RTM). A pressure transducer measures duct static pressure, and the VFD is modulated to maintain the supply air static pressure within an adjustable user-defined range. The range is determined by the supply air pressure setpoint and supply air pressure deadband, which are set through the Human Interface Panel or BAS/Network.

The variable frequency drives provide supply fan motor speed modulation. The drive will accelerate or decelerate as required to maintain the supply static pressure setpoint. When subjected to high ambient return conditions the VFD will reduce its output frequency to maintain operation. Bypass control is offered to provide full nominal airflow in the event of drive failure.

Supply Air Static Pressure Limit

The opening of VAV terminals, and the amount of supply air provided by the variable frequency drive are coordinated during start up and transition to/from Occupied/Unoccupied modes to prevent over pressurization of the supply air ductwork. However, if for any reason the supply air pressure exceeds the user-defined supply air static pressure limit that was set at the Human

Interface Panel, the supply fan and VFD are shut down. The unit is then allowed to restart three times. If the over pressurization condition occurs on the third restart, the unit is shut down and a manual reset diagnostic is set and displayed at the Human Interface Panel and BAS/Network.

Supply Air Temperature Controls

Cooling/Economizer

During Occupied cooling mode of operation, the economizer (if available) and mechanical cooling are used to control the supply air temperature. The supply air temperature setpoint and deadband are user-defined at the Human Interface Panel. The supply air temperature setpoint may be user-defined from the BAS/Network. If the conditions of the outside air are appropriate to use "free cooling," the economizer will be used first in an attempt to satisfy the supply air setpoint; then, if required, the mechanical cooling will be staged on to maintain supply air temperature setpoint. Minimum On/Off timing of the mechanical cooling prevents rapid cycling.

On units with economizer, a call for cooling will modulate the outside air dampers open. The rate of economizer modulation is based on deviation of the supply air temperature from setpoint, i.e., the further away from setpoint, the faster the outside air damper will open. First stage of cooling will be allowed to start after the economizer reaches full open.

The economizer is only allowed to function freely if one of the following conditions is met:

- For dry bulb economizer control the ambient temperature must be below the dry bulb temperature control setting.
- For reference enthalpy economizer control, outdoor air enthalpy must be below the enthalpy control setting. At outdoor air conditions above the enthalpy control setting, mechanical cooling only is used and the outside air dampers remain at minimum position.
- For comparative enthalpy economizer control, outdoor air enthalpy must be below the enthalpy of the return air.

If the unit does not include an economizer, mechanical cooling only is used to satisfy cooling requirements. The outdoor air dampers may be set for a maximum of 25% outdoor air, through the unit mounted Human Interface Panel or a signal from the BAS/network, if the rooftop is equipped with 0 to 25% motorized outside air dampers.

Heating

Modulating Gas

Upon a call for heating, the HEAT module closes the heating contacts, beginning the firing sequence. First, the heat exchanger combustion blower begins operation. Upon positive proving of combustion airflow, a 60 second pre-purge cycle is executed. Then the ignition sequence takes place.

If ignition is not proven, the safety control locks out and must be manually reset. As long as there is a call for heat, the safety control can be reset, which starts another purge cycle and try for ignition.

Once ignited, as additional heat is required, the combustion air damper opens, increasing the firing rate.

During heating operation, an electronic flame safety control provides continuous flame supervision. If combustion should become unstable for any reason, heating will automatically shut down and be locked out until reset at the unit mounted Human Interface panel.

As the heating requirement is satisfied, the HEAT module will modulate the combustion air damper closed and the firing rate will lower to maintain the desired outlet temperature. When the requirement is fully satisfied, the heating contacts are opened, de-energizing the heat. The specific sequence of operation of the gas heat will depend on the size of the heat exchanger.

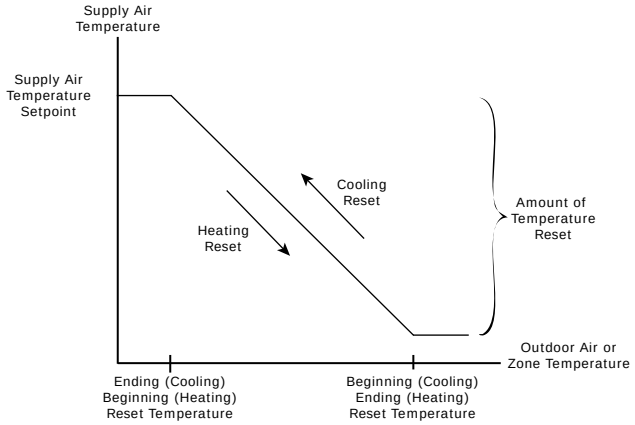
Hot Water or Steam

On units with hot water or steam heating, the supply air temperature can be controlled to a heating setpoint during the Occupied mode. The supply air temperature heating setpoint and deadband are user-defined at the Human Interface Panel. VAV Occupied heating on hot water and steam heat units is enabled by closing a field-supplied switch or On units with hot water or steam heating, the supply air temperature can be controlled to a heating setpoint during the

Occupied mode. The supply air temperature heating setpoint and deadband are user-defined at the Human Interface Panel. VAV Occupied heating on hot water and steam heat units is enabled by closing a field-supplied switch or contacts connected to an changeover input on the RTM.

Supply Air Setpoint Reset

Figure 7. Supply air temperature reset



Supply air setpoint reset can be used to adjust the supply air temperature setpoint on the basis of a zone temperature or on outdoor air temperature. Supply air setpoint reset adjustment is available from the Human Interface Panel for supply air heating and supply air cooling control.

Outdoor air cooling reset

Outdoor air cooling reset is sometimes used in applications where the outdoor temperature has a large effect on building load. When the outside air temperature is low and the building cooling load is low, the supply air setpoint can be raised, thereby preventing sub-cooling of critical zones. This reset can lower usage of mechanical cooling, thus savings in compressor kW, but an increase in supply fan kW may occur.

Outdoor air heating reset

Outdoor air heating reset is the inverse of cooling, with the same principles applied. For both outdoor air cooling reset and heating reset, there are three user-defined parameters that are adjustable through the Human Interface Panel:

- Beginning reset temperature
- Ending reset temperature
- Amount of temperature reset

Zone reset

Zone reset is applied to the zone(s) in a building that tend to be overly cool or overly hot. The supply air temperature setpoint is adjusted based on the temperature of the critical zone(s). This can have the effect of improving comfort and/or lowering energy usage. The user-defined parameters are the same as for outdoor air reset.

Zone Temperature Control

Unoccupied Zone Heating and Cooling

During Unoccupied mode, the unit is operated as a CV unit. VAV boxes are driven full open. The unit controls zone temperature within the Unoccupied zone cooling and heating (heating units only) deadbands.

Daytime Warm-up

This feature is available on all types of heating units. During Occupied mode, if the zone temperature falls to a preset, user-defined zone low limit temperature setpoint, the unit is put into Unoccupied mode and Daytime Warm-up is initiated. The system changes over to CV heating (full unit airflow), the VAV boxes are fully opened and full heating capacity is provided

until the Daytime Warm-up setpoint is reached. The unit is then returned to normal Occupied mode.

Unit Feedback – Supply and Exhaust Fan Speed Setpoints

BACnet® control network (BCI-I) points are available to allow for communication of the Supply and Exhaust Fan Speed Setpoints to the BAS. These points are only available for true VAV units. These setpoints will be overridden by equipment protection functionality, when applicable. These point additions eliminate the need to hard-wire directly to the VFDs for control.

Outside Air CFM Compensation

As the supply fan modulates, this function proportionally adjusts the economizer minimum position to compensate for the change in total airflow, in order to maintain a constant percent of outside air. The modified economizer minimum position is computed as a linear function, based on VFD position, given the two endpoints:

- Minimum Position with VFD @ 0%
- Minimum Position with VFD @ 100%

Both are user adjustable at the Human Interface Panel.

Single Zone Variable Air Volume (SZVAV) Only

The IntelliPak® controls platform will support Single Zone VAV as an optional unit control type in order to meet ASHRAE 90.1. The basic control will be a hybrid VAV/CV configured unit that provides discharge temperature control to a varying discharge air temperature target setpoint based on the space temperature and/or humidity conditions. Concurrently, the unit will control and optimize the supply fan speed to maintain the zone temperature to a zone temperature setpoint.

VFD Control

Single Zone VAV units will be equipped with a VFD-controlled supply fan which will be controlled via a 0-10 VDC signal from the Rooftop Module (RTM). With the RTM supply fan output energized and the RTM VFD output at 0 VDC, the fan speed output is 37% (22Hz) from the VFD by default; and at 10 VDC the fan speed output is 100% (60Hz). The control scales the 0-10 VDC VFD output from the RTM linearly to control between the 37-100% range.

The VFD will modulate the supply fan motor speed, accelerating or decelerating as required to maintain the zone temperature to the zone temperature setpoint. When subjected to high ambient return conditions the VFD will reduce its output frequency to maintain operation. Bypass control is offered to provide full nominal airflow in the event of drive failure.

Supply Fan Output Control

Units configured for Single Zone VAV control will utilize the same supply fan output control scheme as on traditional VAV units except the VFD signal will be based on zone heating and cooling demand instead of the supply air pressure.

Ventilation Control

Units configured for Single Zone VAV control will require special handling of the OA Damper Minimum Position control in order to compensate for the non-linearity of airflow associated with the variable supply fan speed and damper combinations. Units configured for Traq with or without DCV will operate identically to traditional units with no control changes.

Space Pressure Control

For units configured with Space Pressure Control with or without Statitrac, the new schemes implemented for economizer minimum position handling require changes to the existing Space Pressure Control scheme in order to prevent over/under pressurization. The overall scheme will remain very similar to VAV units with Space Pressure Control with the exception of the dynamic Exhaust Enable Setpoint.

For SZVAV an Exhaust Enable Setpoint must be selected during the 100% Fan Speed Command. Once selected, the difference between the Exhaust Enable Setpoint and Design OA Damper Minimum Position at 100% Fan Speed Command will be calculated. The difference calculated will be used as an offset and added to the Active Building Design OA Minimum Position Target in order to calculate the dynamic Exhaust Enable Target, which will be used throughout the Supply Fan Speed/OA Damper Position range.

The Exhaust Enable Target could be above or below the Active Building Design OA Minimum Position Target Setpoint, based on the Active Exhaust Enable Setpoint being set above or below the Building Design Minimum Position at 100% Fan Speed Command. Note that an Exhaust Enable Setpoint of 0% will result in the same effect on Exhaust Fan control as on VAV applications with and without Statitrac.

Occupied Cooling Operation

For normal cooling operation, cooling capacity will be staged or modulated in order to meet the calculated discharge air target setpoint. If the current active cooling capacity is controlling the discharge air within the deadband, no additional cooling capacity change will be requested. As the Discharge Air Temperature rises above the deadband, the algorithm will request additional capacity as required (additional compressors or economizer). As the Discharge Air Temperature falls below the deadband, the algorithm will request a reduction in active capacity.

Default Economizer Operation

By default, the unit will be setup to optimize the minimum supply fan speed capability during Economizer Only operation. If the economizer is able to meet the demand alone, due to desirable ambient conditions, the supply fan speed will be allowed to increase above the minimum prior to utilizing mechanical cooling if discharge air setpoint falls below the discharge air Lower Limit (Cooling) setpoint.

Unoccupied Mode

In Unoccupied periods the unit will utilize setback setpoints, 0% Minimum OA Damper position, and Auto Fan Mode operation as on normal Constant Volume units. The Supply Fan speed, and cooling and modulating types of heat, will be controlled to the discharge air target setpoint as is done during occupied periods.The Supply Fan speed will be forced to 100% for all active heating and cooling requests in this mode.

Occupied Heating Operation

Occupied heating operation has two separate control sequences; staged and modulated. All Staged Heating types will drive the supply fan to maximum flow and stage heating to control to the Zone Heating Setpoint. For units with Hydronic and Gas heat, Modulated Heating type will utilize SZVAV Heating.

On an initial call for heating, the supply fan will drive to the minimum heating airflow. On an additional call for heating, the heat will control in order to meet the calculated discharge air target setpoint. As the load in the zone continues to request heat operation, the supply fan will ramp-up while the control maintains the heating discharge air temperature. Heating can be configured for either the energy saving SZVAV Heating solution as described above, or the traditional, less efficient CV Heating solution.

Compressor (DX) Cooling

Compressor control and protection schemes will function identical to that of a traditional unit. Normal compressor proving and disable input monitoring will remain in effect as well as normal three minute minimum on, off, and inter-stage timers. Also, all existing head pressure control schemes will be in effect.

Cooling Sequence

If the controller determines that there is a need for compressor stages in order to meet the calculated discharge air target setpoint, once supply fan proving has been made, the unit will begin to stage compressors accordingly.

Note: *The compressor staging order will be based on unit configuration and compressor lead/lag status.*

Once the discharge air target setpoint calculation has reached the user define Minimum Setpoint and compressors are being utilized to meet the demand, if the cooling demand increases, the discharge air target setpoint value will continue to lower past the minimum setpoint and begin to ramp the supply fan speed upward toward 100%.

Once the discharge air target setpoint calculation has reached the Minimum Setpoint and compressors are being utilized to meet the demand, as the discharge air target setpoint value continues to calculate lower the algorithm will begin to ramp the supply fan speed up toward 100%. Note that the supply fan speed will remain at the compressor stage's associated minimum value (as described below) until the discharge air target setpoint value is calculated below the discharge air temperature Minimum Setpoint (limited discharge air target setpoint).

As the cooling load in the zone decreases the zone cooling algorithm will reduce the speed of the fan down to minimum per compressor stage and control the compressors accordingly. As the compressors begin to de-energize, the supply fan speed will fall back to the Cooling Stage's associated minimum fan speed, but not below. As the load in the zone continues to drop, cooling capacity will be reduced in order to maintain the discharge air within the ±½ discharge air target deadband.

Constant Volume (CV) Only

Occupied Zone Temperature Control

Cooling/Economizer

During Occupied cooling mode, the economizer (if provided) and mechanical cooling are used to control zone temperature. The zone temperature cooling setpoint is user-defined at the Human Interface Panel or from the BAS/Network. If the conditions of outside air is appropriate to use "free cooling", the economizer will be first be used to attempt to satisfy the cooling zone temperature setpoint; then the compressors will be staged up as necessary. Minimum on/off timing of compressors prevents rapid cycling.

On units with economizer, a call for cooling will modulate the outside air dampers open. The rate of economizer modulation is based on deviation of the zone temperature from setpoint, i.e., the further away from setpoint, the faster the outside air damper will open. First stage of cooling will be allowed to start after the economizer reaches full open.

The economizer is only allowed to function freely if one of the following conditions is met:

- For dry bulb economizer control, the ambient temperature must be below the dry bulb temperature control setting.
- For reference enthalpy economizer control, outdoor air enthalpy must be below the enthalpy control setting. At outdoor air conditions above the enthalpy control setting, mechanical cooling only is used and the outdoor air dampers remain at minimum position.
- For comparative enthalpy economizer control, outdoor air enthalpy must be below the enthalpy of the return air.

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If the unit does not include an economizer, mechanical cooling only is used to satisfy cooling requirements. The outdoor air dampers may be set for a maximum of 25% outdoor air, through the unit mounted Human Interface Panel or a signal from the BAS/network, if the rooftop is equipped with 0 to 25% motorized outside air dampers.

Heating

Gas Heating: Two-Stage

Upon a call for heating, the HEAT module closes the first stage heating contacts beginning the firing sequence. First, the heat exchanger combustion blower begins operation. Upon positive proving of combustion airflow, a 60 second pre-purge cycle is executed. Then the ignition sequence takes place.

If ignition is not proven, the safety control locks out and must be manually reset. As long as there is a call for heat, the safety control can be reset, which starts another purge cycle and try for ignition. As additional heat is required, the HEAT module will close the second stage heating contacts and depending on heat module size, will open either the second stage of the gas valve, or a second stage gas valve.

During heating operation, an electronic flame safety control provides continuous flame supervision. If combustion should become unstable for any reason, heating will automatically shut down. On the low heat for all unit sizes and the medium heat for the 90 and 105 ton, after a one minute delay, plus another 60 second pre-purge cycle the ignition cycle begins. On all other heat sizes the heating section will be shutdown and locked out after the first shutdown due to flame instability, until manually reset at the ignition module and at the unit-mounted Human Interface Panel .

As the heating requirement is satisfied, the HEAT module will open the second stage heating relay, de-energizing the second stage of heat. When the requirement is fully satisfied, the first stage contacts are opened, de-energizing the first stage of heat.

Gas Heating: Modulating Gas

Upon a call for heating, the HEAT module closes the heating contacts, beginning the firing sequence. First, the heat exchanger combustion blower begins operation. Upon positive proving of combustion airflow, a pre-purge cycle is executed. Then the ignition sequence takes place.

If ignition is not proven, the safety control locks out and must be manually reset. As long as there is a call for heat, the safety control can be reset, which starts another purge cycle and try for ignition. Once ignited, as additional heat is required, the combustion air damper opens, increasing the firing rate. During heating operation, an electronic flame safety control provides continuous flame supervision. If combustion should become unstable for any reason, heating will automatically shut down and be blocked out until reset at the unit-mounted Human Interface panel.

As the heating requirement is satisfied, the HEAT module will modulate the combustion air damper closed, and the firing rate will lower to maintain the desired outlet temperature. When the requirement is fully satisfied, the heating contacts are opened, de-energizing the heat. The specific sequence of operation of the gas heat will depend on the size of the heat exchanger.

Gas Heating: Ultra Modulating Gas

Upon a call for heating, the heat module closes the heating contact and sends a 10VDC signal to the heat exchanger's combustion blower controller. Upon positive proving of combustion airflow, the DC signal runs the heat exchanger's combustion blower at maximum speed, and the pre-purge cycle is executed. After 30 seconds of pre-purge, the ignition sequence then takes place.

If ignition is not proven, the safety control locks out and must be manually reset. As long as there is a call for heat, the burner controller can be reset, which starts another purge cycle and ignition attempt. Once the heater has been ignited, the DC input drops to 2VDC and the blower goes to minimum speed. Additional heat is provided through ramping of the DC signal/speed of the combustion blower. During heating operation, the burner controller uses a flame sensor to provide continuous flame supervision. If combustion should become unstable for any reason, heating will automatically shut down and be blocked out until reset at the unit mounted Human Interface panel.

As the heating requirement is satisfied, the Heat module will modulate the combustion blower slower to maintain the desired outlet temperature. When the heating requirement is fully satisfied, the heating contact is opened, and the burner controller is de-energized. The specific sequence of operation of the gas heather will depend on the size of the heat exchanger.

Electric Heating

The individual stages of electric heat will be sequenced on the zone demand signal from the zone sensor. The signal is sent to the UCM and the stages are sequenced based on load demand. The number of available stages will depend on the unit size and heat capacity selected.

For units with SCR electric heat, the first stage is modulating. The modulating stage and the necessary additional stages are sequenced to precisely meet the zone demand.

Hot Water or Steam Heating

Upon a call for heat, the UCM will send a varying voltage signal to the valve actuator. The valve will modulate to meet building demand as indicated by the voltage signal. When heating is satisfied, the valve will modulate closed. A temperature sensor is located on the coldest section of the coil. When it senses an impending freeze condition, a signal is sent to the hydronic valve to drive it full open. If the supply fan is on, or if the outside air damper is open when this freezing condition is sensed, the supply fan is turned off and the outside air damper is closed.

Auto Changeover

When the System Mode is "Auto," the mode will change to cooling or heating as necessary to satisfy the zone cooling and heating setpoints. The zone cooling and heating setpoints can be as close as 2°F apart.

Unoccupied Zone Temperature Control

Cooling and Heating

Cooling and/or heating modes can be selected to maintain Unoccupied zone temperature setpoints. For Unoccupied periods, heating, economizer operation or compressor operation can be selectively locked out at the Human Interface Panels.

CV, SZVAV, and VAV

Note: *SZVAV exceptions are noted in parenthesis.*

Space Pressure Control - Statitrac

A pressure transducer is used to measure and report direct space (building) static pressure. The user-defined control parameters used in this control scheme are space static pressure setpoint, space pressure deadband and exhaust enable point. As the economizer opens, the building pressure rises and once above the exhaust enable point, enables the exhaust fan and dampers or exhaust VFD. The exhaust dampers or VFD then modulate to maintain space pressure within the deadband.

Morning Warm-up Options (Not applicable to SZVAV)

This feature is available on all types of factory-installed heat units and on units with no heat, this function may still be selected to support systems with heat sources not provided by the rooftop unit. At the conclusion of Unoccupied mode, while the economizer (if supplied) is kept closed, the selected zone is heated to the user-defined Morning Warm-up setpoint (see descriptions below). The unit is then released to Occupied mode.

Full Capacity Morning Warm-up (MWU)

Full capacity Morning Warm-up uses full heating capacity, and heats the zone up as quickly as possible. Full heating capacity is provided until the Morning Warm-up setpoint is met. At this point, the unit is released to occupied mode.

Cycling Capacity Morning Warm-up (MWU)

Cycling capacity Morning Warm-up provides a more gradual heating of the zone. Normal zone temperature control with varying capacity is used to raise the zone temperature to the MWU zone temperature setpoint. This method of warm-up is used to overcome the "building sink" effect. Cycling capacity MWU will operate until the MWU setpoint is reached or for 60 minutes, then the unit switches to Occupied mode. A control algorithm is used to increase or decrease the amount of heat in order to achieve the MWU zone temperature setpoint.

Note: *When using the Morning Warm-up option in a VAV heating/cooling rooftop, airflow must be maintained through the rooftop unit. This can be accomplished by electrically tying the VAV boxes to the VAV box output relay contacts on the Rooftop Module (RTM) or by using changeover thermostats. Either of these methods will assure adequate airflow through the unit and satisfactory heating of the building.*

Supply Air Tempering

Modulating gas, electric, hot water and steam heat units only—when supply air temperature falls below the supply air temperature deadband low end, the heat valve is modulated open to maintain the set minimum supply air temperature.

Emergency Override

When a LonTalk® communication protocol or BACnet® control network is installed, the user can initiate from the Tracer® Ensemble™ building automation system (BAS) (in the case of LCI), Tracer® SC+ or third party BAS (with either BCI or LCI) one of five predefined, not available to configure, Emergency Override sequences. All compressors, condenser fans and the Humidification output are de-energized for any Emergency Override sequence. Each Emergency Override sequence commands the unit operation as follows:

PRESSURIZE_EMERG:

- Supply Fan - On
- Supply Fan VFD - Max(if so equipped)
- Exhaust Fan - Off; Exhaust Dampers - Closed (if so equipped)
- OA Dampers - Open; Return Damper - Closed
- Heat - All heat stages off; Mod Heat output at 0 VDC
- Occupied/Unoccupied/VAV box output - Energized
- VOM Relay - Energized (if so equipped)
- Preheat Output - Off
- Return Fan - Off; Exhaust Dampers - Closed (if so equipped)
- Return VFD - Min (if so equipped)

EMERG_DEPRESSURIZE:

- Supply Fan - Off
- Supply Fan VFD - Min (if so equipped)
- Exhaust Fan - On; Exhaust Dampers - Open/Max (if so equipped)
- OA Dampers - Closed; Return Damper - Open
- Heat - All heat stages off; Mod Heat output at 0 VDC
- Occupied/Unoccupied/VAV box output - Energized
- VOM Relay - Energized (if so equipped)
- Preheat Output - Off
- Return Fan - On; Exhaust Dampers - Open (if so equipped)
- Return VFD - Max (if so equipped)

EMERG_PURGE:

- Supply Fan - On
- Supply Fan VFD - Max (if so equipped)
- Exhaust Fan - On; Exhaust Dampers Open (if so equipped)
- OA Dampers - Open; Return Damper - Closed
- Heat - All heat stages off; Mod Heat output at 0 VDC
- Occupied/Unoccupied/VAV box output - Energized
- VOM Relay - Energized (if so equipped)
- Preheat Output - Off
- Return Fan - On; Exhaust Dampers - Open (if so equipped)
- Return VFD - Max (if so equipped)

EMERG_SHUTDOWN:

- Supply Fan - Off
- Supply Fan VFD - Min (if so equipped)
- Exhaust Fan - Off; Exhaust Dampers Closed (if so equipped)
- OA Dampers - Closed; Return Damper - Open
- Heat - All heat stages off; Mod Heat output at 0 VDC
- Occupied/Unoccupied/VAV box output - Energized
- VOM Relay - Energized (if so equipped)

- Preheat Output - Off
- Return Fan - Off; Exhaust Dampers - Closed (if so equipped)
- Return VFD - Min (if so equipped)

EMERG_FIRE - Input from fire pull box/system:

- Supply Fan - Off
- Supply Fan VFD - Min (if so equipped)
- Exhaust Fan - Off; Exhaust Dampers Closed (if so equipped)
- OA Dampers - Closed; Return Damper - Open
- Heat - All heat stages off; Mod Heat output at 0 VDC
- Occupied/Unoccupied/VAV box output - Energized
- VOM Relay - Energized (if so equipped)
- Preheat Output - Off
- Return Fan - Off; Exhaust Dampers - Closed (if so equipped)
- Return VFD - Min (if so equipped)

Ventilation Override Module (VOM)

The user can customize up to five different override sequences for purposes of ventilation override control. If more than one VOM sequence is being requested, the sequence with the highest priority is initiated first. Sequence hierarchy is the sequence "A" (UNIT OFF) is first, with sequence "E" (PURGE with Duct Pressure Control) last. A ventilation override mode can be initiated by closing any of the five corresponding binary inputs on the VOM module. A binary output is provided on the VOM module to provide remote indication of an active VOM mode. All compressors, condenser fans and the Humidification output are de-energized for any VOM sequence. The factory default definitions for each mode are as follows:

UNIT OFF sequence "A"

When complete system shutdown is required the following sequence can be used.

- Supply Fan - Off
- Supply Fan VFD - Min (if so equipped)
- Exhaust Fan - Off; Exhaust Dampers - Closed (if so equipped)
- OA Dampers - Closed; Return Damper - Open
- Heat - All heat stages off; Mod Heat output at 0 VDC
- Occupied/Unoccupied/VAV box output - Deenergized
- VOM Relay - Energized
- Preheat Output - Off
- Return Fan - Off; Exhaust Dampers - Closed (if so equipped)
- Return VFD - Min (if so equipped)
- OA Bypass Dampers - Open (if so equipped)
- Exhaust Bypass Dampers - Open (if so equipped)

PRESSURIZE sequence "B"

Perhaps a positively pressurized space is desired instead of a negatively pressurized space. In this case, the supply fan should be turned on with VFD at 100% speed and exhaust fan should be turned off.

- Supply Fan - On
- Supply Fan VFD - Max (if so equipped)
- Exhaust Fan - Off; Exhaust Dampers - Closed (if so equipped)
- OA Dampers - Open; Return Damper - Closed
- Heat - All heat stages off; Mod Heat output at 0 VDC
- Occupied/Unoccupied/VAV box output - Energized
- VOM Relay - Energized
- Preheat Output - Off
- Return Fan - Off; Exhaust Dampers - Closed (if so equipped)
- Return VFD - Min (if so equipped)
- OA Bypass Dampers - Open (if so equipped)
- Exhaust Bypass Dampers - Open (if so equipped)

EXHAUST sequence "C"

With only the exhaust fans running (supply fan off), the space that is conditioned by the rooftop would become negatively pressurized. This is desirable for clearing the area of smoke from the now-extinguished fire, possibly keeping smoke out of areas that were not damaged.

- Supply Fan - Off
- Supply Fan VFD - Min (if so equipped)
- Exhaust Fan - On; Exhaust Dampers Open (if so equipped)
- OA Dampers - Closed; Return Damper - Open
- Heat - All heat stages off; Mod Heat output at 0 VDC
- Occupied/Unoccupied/VAV box output - Deenergized
- VOM Relay - Energized
- Preheat Output - Off
- Return Fan - On; Exhaust Dampers - Open (if so equipped)
- Return VFD - Max (if so equipped)
- OA Bypass Dampers - Open (if so equipped)
- Exhaust Bypass Dampers - Open (if so equipped)

PURGE sequence "D"

Possibly this sequence could be used for purging the air out of a building before coming out of Unoccupied mode of operation on VAV units or for the purging of smoke or stale air if required after a fire.

- Supply Fan - On
- Supply Fan VFD - Max (if so equipped)
- Exhaust Fan - On; Exhaust Dampers Open (if so equipped)
- OA Dampers - Open; Return Damper - Closed
- Heat - All heat stages off; Mod Heat output at 0 VDC
- Occupied/Unoccupied/VAV box output - Energized
- VOM Relay - Energized
- Preheat Output - Off
- Return Fan - On; Exhaust Dampers - Open (if so equipped)
- Return VFD - Max (if so equipped)
- OA Bypass Dampers - Open (if so equipped)
- Exhaust Bypass Dampers - Open (if so equipped)

PURGE with duct pressure control sequence "E"

This sequence can be used when supply air control is required for smoke control.

- Supply Fan - On
- Supply Fan VFD - (If so equipped) Controlled by Supply Air Pressure Control function; Supply Air Pressure High Limit disabled
- Exhaust Fan - On; Exhaust Dampers Open (if so equipped)
- OA Dampers - Open; Return Damper - Closed
- Heat - All heat stages off; Mod Heat output at 0 VDC
- Occupied/Unoccupied/VAV box output - Energized
- VOM Relay - Energized
- Preheat Output - Off
- Return Fan - On; Exhaust Dampers - Open (if so equipped)
- Return VFD - Max (if so equipped)
- OA Bypass Dampers - Open (if so equipped)
- Exhaust Bypass Dampers - Open (if so equipped)

To use a RHI the unit must be equipped with an optional Inter-Processor Communications Bridge (IPCB) module. The RHI can be located up to 1,000 feet from the unit. A single RHI can be used to monitor and control up to four (4) rooftops, each containing an IPCB.

Human Interface Panel (HI)

The Human Interface (HI) Panel provides a 2 line X 40 character clear English liquid crystal display and a 16 button keypad for monitoring, setting, editing and controlling. The Human Interface Panel is mounted in the unit's main control panel and is accessible through an independent door.

The optional remote mount version of the Human Interface (RHI) Panel has all the functions of the unit mount version except Service Mode.

To use a RHI the unit must be equipped with an optional InterProcessor Communications Bridge (IPCB). The RHI can be located up to 1,000 feet from the unit. A single RHI can be used to monitor and control up to 4 rooftops, each containing an IPCB.

Human Interface Panel Main Menu

- **STATUS** — used to monitor all temperatures, pressures, humidities, setpoints, input and output status.
- **CUSTOM** — allows the user to create a custom status menu consisting of up to four (4) screens of the data available in the Status menu.
- **SETPOINTS** — used to review and/or modify all the factory preset Default setpoints and setpoint source selections.
- **DIAGNOSTICS** — used to review active and historical lists of diagnostic conditions. A total of 49 different diagnostics can be read at the Human Interface Panel. The last 20 unique diagnostics can be held in an active history buffer log.
- **SETUP** — Control parameters, sensor source selections, function enable/disable, output definitions, and numerous other points can be edited in this menu. All points have factory preset values so unnecessary editing is kept to a minimum.
- **CONFIGURATION** — Preset with the proper configuration for the unit as it ships from the factory, this information would be edited only if certain features were physically added or deleted from the unit. For example, if a field supplied Ventilation Override Module was added to the unit in the field, the unit configuration would need to be edited to reflect that feature.
- **SERVICE** — used to selectively control outputs (for compressors, fans, damper position, etc.) for servicing or troubleshooting the unit. This menu is accessible only at the unit mounted Human Interface Panel.

Demand Limit

This mode is used to reduce electrical consumption at peak load times. When demand limiting is needed, mechanical cooling and/or heating operation are either partially or completely disabled in order to save energy.

This function is operational on units with a GBAS. There are two types of demand limiting, 50% and 100%. When demand limiting is needed, mechanical cooling and heating operation are either partially (50%), or completely disabled (100%), in order to save energy. The definition of Demand Limit is user definable at the human interface panel. Demand Limit binary input accepts a field supplied switch or contact closure. When the request for demand limit has been cancelled, the unit cooling and/or heating functions will become fully enabled.

Generic Building Automation System Module (GBAS 0-5 / 0-10 VDC)

The Generic Building Automation System Module (GBAS) is used to provide broad control capabilities for building automation systems other than the Trane Tracer Summit™ building automation system. The modules differ on the input signal and the number of binary I/O.

The following inputs and outputs are provided:

Analog Inputs — Four analog inputs, controlled via a field provided potentiometer or a VDC signal.

Table 1. Analog inputs (0-5 VDC, 0-10 VDC)

Set Point	System Control
Occupied Zone Cooling Setpoint	CV and SZVAV
Unoccupied Zone Cooling Setpoint	ALL
Occupied Zone Heating Setpoint	CV and SZVAV
Unoccupied Zone Heating Setpoint	ALL
Supply Air Cooling Setpoint	CV, SZVAV, VAV[a]
Supply Air Heating Setpoint	CV, SZVAV, VAV[a]
Space Static Pressure Setpoint	ALL
Supply Air Static Pressure Setpoint	VAV
Minimum Outside Air Flow Setpoint	ALL
Morning Warm Up Setpoint	CV & VAV
Economizer Dry Bulb Enable Setpoint	ALL
Minimum Outside Air Position Setpoint	ALL
Occupied Humidification Setpoint	ALL
Unoccupied Humidification Setpoint	ALL
Occupied Dehumidification Setpoint	ALL
Unoccupied Dehumidification Setpoint	ALL

[a] With discharge temperature control only

Analog Outputs — Four analog outputs that can be configured to be any of the following:

Table 2. Analog outputs (0-10 VDC only)

Ouput	System Control
Outdoor Air Temperature	ALL
Zone Temperature	ALL
Supply Air Temperature	CV, SZVAV, VAV[a]
Supply Air Pressure	SZVAV and VAV
Space Pressure	ALL
Space Relative Humidity	ALL
Outdoor Air Relative Humidity	ALL
Space CO_2 Level	ALL
Compressor Staging (%)	ALL
Heat Staging (%)	ALL
Outdoor Air Damper Position	ALL
Outdoor Airflow	ALL
Occupied Humidification Setpoint	ALL
Unoccupied Humidification Setpoint	ALL

[a] With discharge temperature control only

Binary Outputs — each of the five relay outputs can be mapped to any/all of the available diagnostics.

Binary Input — the single binary input can initiate or terminate the Demand Limit mode of operation via a field supplied switch or contact closure.

Frost Avoidance

Evaporator Coil Frost Protection - Frostat™

A temperature sensor on each evaporator circuit is used to determine if the coil is getting close to a freezing condition. Mechanical cooling capacity is shed as necessary to prevent icing. The Frostat™ system eliminates the need for hot gas bypass and utilizes the suction line surface temperature sensor near the TXV bulb location to shed cooling when coil frosting conditions occur. The supply fans are not shut off and will de-ice the coil. Timers prevent the compressors from rapid cycling.

Steam and Hot Water Coil - Freeze Avoidance

Freeze Avoidance is a feature which helps prevent freezing of steam or hot water heat coils during periods of unit inactivity and low ambient temperatures. Whenever the unit supply fan is off, the outdoor air temperature is monitored. If the temperature falls below a predetermined value, the heating valve is opened to a position selected at the unit mounted Human Interface to allow a minimum amount of steam or hot water to flow through the coil and avoid freezing conditions.

Occupied/Unoccupied Switching

There are three ways to switch Occupied/Unoccupied:

- Night Setback (NSB) Panel
- Field-supplied contact closure (hard wired binary input to RTM) (CV, SZVAV and VAV)
- Tracer (or third party BAS with LCI or BCI module)

Night Setback Sensors

The Trane night setback sensors are programmable with a time clock function that provides communication to the rooftop unit through a two-wire communications link. The desired transition times are programmed at the night setback sensor and communicated to the rooftop.

Night setback (unoccupied mode) is operated through the time clock provided in the sensors with night setback. When the time clock switches to night setback operation, the outdoor air dampers close and heating/cooling can be enabled or disabled depending on setup parameters. As the building load changes, the night setback sensor energizes the rooftop heating/cooling (if enabled) function and the evaporator fan. The rooftop unit will cycle through the evening as heating/cooling (if enabled) is required in the space. When the time clock switches from night setback to occupied mode, all heating/cooling functions begin normal operation.

When using the night setback options with a VAV heating/cooling rooftop, airflow must be maintained through the rooftop unit. This can be accomplished by electrically tying the VAV boxes to the VAV Box output relay contacts on the Rooftop Module (RTM) or by using changeover thermostats. Either of these methods will assure adequate airflow through the unit and satisfactory temperature control of the building.

Trane Tracer® Ensemble™ or BAS System

The Tracer® Ensemble™ building management system or a third party BAS (with LCI or BCI module) can control the Occupied/Unoccupied status of the rooftop.

Timed Override Activation - ICS

This function is operational when the RTM is selected as the Zone Temperature Sensor source at the Human Interface Panel. When this function is initiated by the push of an override button on the ICS sensor, the Tracer Ensemble will switch the unit to the Occupied mode. Unit operation (Occupied mode) during timed override is terminated by a signal from Tracer.

Timed Override Activation - Non-ICS

This function is active whenever the RTM is selected as the Zone Temperature Sensorsource at the Human Interface Panel. When this function is initiated by the push of an override button on the zone sensor, the unit will switch to the Occupied mode. Automatic Cancellation of the Timed Override Mode occurs after three hours of operation.

Outdoor Air Damper Fault Detection and Diagnostics

Fault Detection of the Outdoor Air Damper will be evaluated based on the commanded position of the damper compared to the feedback position of the damper. The damper is commanded to a position based on a 0-10 / 2-10 VDC signal. If the Damper position is outside of the commanded position, a diagnostic is generated. The new Diagnostics can be placed into two groups, Economizer and Outdoor Air Damper. To be classified as an Economizer diagnostic, the unit must be actively cooling with either mechanical cooling and or Economizer cooling. The following are the Diagnostics displayed by the Controller: Unit Not Economizing when it should be, Unit Economizing when it should not be, Outdoor Air Damper Not Modulating, Excessive Outdoor Air.

Economizer Controls

Comparative Enthalpy Control of Economizer

An optional comparative enthalpy system is used to control the operation of the economizer, and measures the temperature and humidity of both return air and outside air to determine which source has lower enthalpy. This system allows true comparison of outdoor air and return air enthalpy by measurement of outdoor air and return air temperatures and humidities.

Reference Enthalpy Control of Economizer

The optional reference enthalpy compares outdoor air temperature and humidity to the economizer enthalpy control setpoint. If outdoor air temperature and humidity are below the economizer enthalpy control setpoint, the economizer will operate freely. This system provides more sophisticated control where outdoor air humidity levels may not be acceptable for building comfort and indoor air quality.

Dry Bulb Temperature Control of Economizer

The optional dry bulb system measures outdoor temperature comparing it to the economizer control temperature setpoint. If the outdoor temperature is below the economizer dry bulb temperature control setpoint, the economizer will operate freely. This system is best suited for arid regions where the humidity levels of outside air would not be detrimental to building comfort and indoor air quality.

Compressor Lead/Lag

Compressor lead/lag is always set as enabled on all units. After each request for compressor operation, the lead refrigeration circuit or compressor on 24-36 tons units switches, thereby causing a more equitable or balanced run time among compressors. Lead/lag is not available on units with hot gas bypass.

Emergency Stop Input

A binary input is provided on the Rooftop Module (RTM) for installation of field provided switch or contacts for immediate shutdown of all unit functions.

CO_2 Control - Demand Control Ventilation (DCV)

A ventilation reset function that provides the necessary ventilation for occupants and reduces energy consumption by minimizing the outdoor air damper position (or the OA flow setpoint with Traq) below the Building Design Minimum, while still meeting the ASHRAE Std 62.1-2004 ventilation requirements.

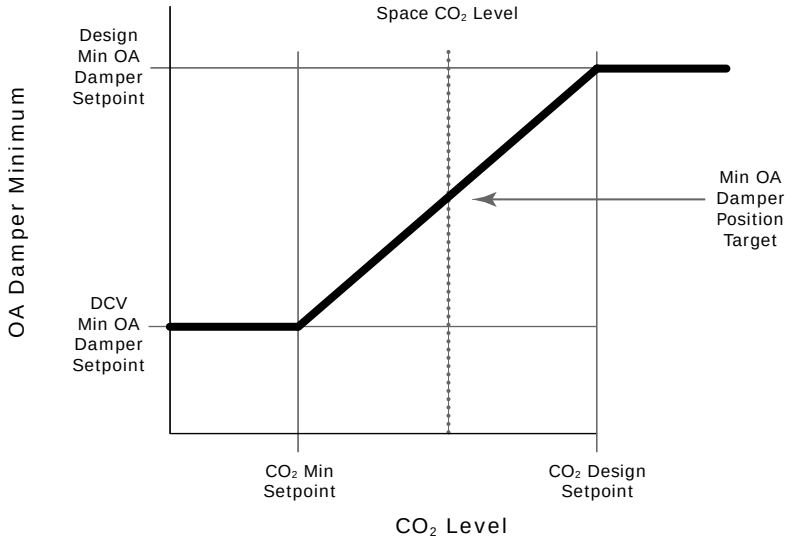
- If the space CO_2 level is greater than or equal to the CO_2 Design Setpoint, the outdoor air damper will open to the Design Min Outdoor Air Damper (or OA Flow) Setpoint. If there is a

call for economizer cooling, the outdoor air damper may be opened further to satisfy the cooling request.

- If the space CO_2 level is less than or equal to the CO_2 Minimum Setpoint, the outdoor air damper will close to the DCV Minimum Outdoor Air Damper (or OA Flow) Setpoint. If there is a call for economizer cooling, the outdoor air damper may be opened further to satisfy the cooling request.
- If the space CO_2 level is greater than the CO_2 Minimum Setpoint and less than the CO_2 Design Setpoint, the outdoor air damper position is (or OA flow) modulated proportionally to the Space CO_2 level relative to a point between the CO_2 Min Setpoint and the CO_2 Design Setpoint. If there is a call for economizer cooling, the outdoor air damper may be opened further to satisfy the cooling request.

Note: *CO_2 sensor used with Demand Control Ventilation must be powered from an external power source or separate 24 VAC transformer.*

Figure 8. CO_2 control



Humidification Control

A relay output is provided to control an externally connected, field supplied humidifier. Logic is provided for Occupied and Unoccupied humidification control with safeguards to prevent cycling between humidification and dehumidification

Return Fan Control

A return fan reduces the load on the supply fan motor or can allow a unit to operate at a higher static pressure. The return fan VFD is modulated independently to maintain desired return air plenum pressure. In all other cases the return fan is turned on or off with the supply fan.

Low Charge Protection

The low charge feature measures the entering and leaving evaporator temperatures on each circuit to calculate a superheat value for each circuit. The superheat value is used for multiple purposes:

- Displayed at the Human Interface panel to assist the service technician with unit charging and diagnostics
- A diagnostic message displayed at the Human Interface panel, warning of a low charge situation when the unit is just slightly undercharged. The unit will be allowed to run.
- A diagnostic message displayed at the Human Interface panel, warning of a low charge situation when the unit is undercharged. The undercharged circuit will be locked out to protect the compressors.

LonTalk® Building Automation System

The LonTalk® communication protocol for the IntelliPak (LCI-I) controller expands communications from the unit UCM network to a Tracer® Ensemble™ building automation system or third party building automation system. Utilizing LonTalk®, the BAS allows external setpoint and configuration adjustment and monitoring of status and diagnostics. The LCI-I utilizes an FTT-10A free topology transceiver, which supports non-polarity sensitive, free topology wiring—which in turn allows the system installer to utilize star, bus, and loop architectures. This controller works in standalone mode, peer-to-peer with one or more other units, or when connected to a Tracer® Ensemble™ or a third party building automation system that supports LonTalk®. The LCI-I controller is available as a factory or field-installed kit.

BACnet® Building Automation Control Network

The BACnet® control network for IntelliPak (BCI-I) expands communications from the unit UCM network to the Tracer® Ensemble™ building automation system or third party building automation system. Utilizing BACnet, the BAS allows external setpoint and configuration adjustment and monitoring of status and diagnostics. The BCI-I utilizes the BACnet defined MS/TP protocol as defined in ASHRAE standard 135-2004. This controller works in standalone mode, with Tracer® Ensemble™ or when connected to a third party building automation system that supports BACnet. The BCI-I controller is available as a factory or field-installed kit.

AirFi® Wireless Communication Interface

Trane AirFi® Wireless Comm replaces the BACnet communication link and sensor wire on Tracer® building automation systems for faster, easier, lower-risk installation and life-cycle savings.

Twinning

Twinning is a main unit and one or more similarly configured dependent unit(s) operating cooperatively, to provide higher capacity and/or redundancy at partial capacity.

Twinning requires an LCI module be installed in each unit and is accomplished by binding variables between unit communication modules, communicating common setpoints and conditions (temperatures, pressures, fan speeds, damper positions, occupancy, states, etc.), and allowing each unit to run independent algorithms.

Note: *BCI-I does not have twinning capabilities.*

Twinned units must share a common supply and return duct network. Twinned units operate:

- as part of a Trane Integrated Comfort System installation, with Tracer Summit.
- on an inter-operable project with a third party LonTalk.
- as an independent group (bound via Rover or third party tool).

Hot Gas Bypass Control

A hot gas bypass valve is installed on circuit 2. The valve modulates hot gas to the inlet of the evaporator when suction pressure falls below valve adjustable setpoint. This feature allows operation at low airflow, while avoiding coil frosting and damage to the compressors.

Modulating Hot Gas Reheat

When space conditions allow, the modulating hot gas reheat function activates the reheat mode. The reheat valve and cooling valve are modulated to control the discharge air temperature to the discharge air temperature reheat setpoint (default 70 °F).

In reheat mode, the reheat valve is commanded (15 to 85%) to control to the discharge air reheat setpoint and the cooling valve mirrors the reheat valve position (85 to 15%).

Low Ambient Compressor Lockout

This function will lock out the compressor if the outdoor air temperature is below the low ambient compressor lock out temperature setpoint. The factory setpoint is 50°F on standard units and 0°F on low ambient units. This setpoint is adjustable at the Human Interface Panel.

Compressors will be locked out when outdoor air temperatures fall below the selected temperature and will be allowed to start again when temperatures rise 5°F above the setpoint.

Application Considerations

Available Options

High Capacity

Rooftops are popular because of their "packaged" nature. Everything needed is contained in one box; mix-matching is neither necessary nor available. With this convenience comes some disadvantages, among them correctly matching cooling capacity to building load. For example, a 50 ton rooftop would need to be used on an application that is 41 tons, simply because the 9040 ton rooftop does not meet capacity. Matching the rooftop's capacity to the building load is critical, which is why the IntelliPak line offers a high capacity compressors or coil options on its rooftops.

On the 40 to 75 ton units, this high capacity option includes larger compressors, which provide higher refrigerant mass flow rates that result in higher capacity. The 90 ton unit has the option of a high capacity evaporator with an added high efficiency condenser coil. The 105 ton is only available with a high capacity evaporator coil. Capacity tables for both standard and high capacity units are available in the cooling data section of this catalog. Use the pressure drops associated with the high capacity coil option on the 90 and 105 ton by adding them to the total static pressure used to size the supply fan motor. eFlex™, variable speed compressors also help units match the load needed by varying the compressor down to 15% of full load.

High Efficiency Methods

High Efficiency and eDrive™ Direct Drive Plenum Supply Fans

Trane offers a high-efficiency option for 20 to 75 ton units. This option is especially helpful in meeting high efficiency requirements legislated by some states as well as qualifying for local utility rebates. High efficiency units meet CEETier 2 requirements.

The 90 ton unit can be equipped with an increased number of condenser coil rows to enhance the rooftop capacity and efficiency. This option is especially helpful to meet the high efficiency requirements legislated by some states, and to qualify for local utility rebates. Capacity tables for both standard and high efficiency condenser coils are available in the cooling data section of this catalog.

eFlex™ Variable Speed

A state of the art Trane eFlex™ variable speed compressor is combined with fixed capacity compressors to provide a superior part load efficiency (IEER) option. Compressor designs are optimized and selected to maximize part load performance. Continuous capacity from 15-100% means that discharge air temperature is controlled within +/-1°F. This eliminates discharge air temperature swings caused by cycling fixed capacity compressors, improves humidity control, and leads to increased comfort in the space.

Note: *Available on 40 to 75 ton units. 20-30 ton units available with Digital Scrolls.*

Supply Fan Flexibility

Trane offers two types of supply fans as options for 20 to 75 ton units. These units may be ordered with a traditional belt-driven, forward-curved (FC) fan or with a beltless direct-drive plenum (DDP) fan. The DDP fans offer multiple width options to optimize fan efficiency for the system design point. Depending on design points, a DDP fan may offer an efficiency gain for the unit. DDP fans offer increased reliability and require less maintenance than FC fans because there are no belts to tension or replace, no bearings to grease, and no sheaves to align. See Trane's engineering bulletin on DDP fans (RT-PRB033-EN) for more application details.

Exhaust/Return Fan Options

When is it necessary to provide building exhaust? Whenever an outdoor air economizer is used, a building generally requires an exhaust system. The purpose of the exhaust system is to exhaust the proper amount of air to prevent over or under-pressurization of the building. The goal is to exhaust approximately 10% less air than the amount of outside air going into the building. This maintains a slightly positive building pressure.

The reason for applying either a return, or exhaust fan is to control building pressure. The Trane 100% modulating exhaust system with Statitrac is an excellent choice for controlling building pressure in the majority of applications. For more demanding applications, Trane's 100% modulating return fan system with Statitrac is an excellent choice for systems with high return static pressure losses, or duct returns. Both systems employ direct digital control technology to maintain building pressure. Either return or exhaust fan systems with Statitrac may be used on any rooftop application that has an outdoor air economizer.

A building may have all or part of its exhaust system in the rooftop unit. Often, a building provides exhaust external to the air conditioning equipment. This external exhaust must be considered when selecting the rooftop exhaust system.

With an exhaust fan system, the supply fan motor and drives must be sized to overcome the total system static pressure, including return losses, and pull return air back to the unit during non-economizer operation. However, a supply fan can typically overcome return duct losses more efficiently than a return air fan system. Essentially, one large fan by itself is normally more efficient than two fans in series because of only one drive loss, not two as with return fan systems.

In a return fan system, the return fan is in series with the supply fan, and operates continuously whenever the supply fan is operating to maintain return air volume. The supply fan motor and drives are sized to deliver the design CFM based on internal and discharge static pressure losses only. The return fan motor and drives are sized to pull the return CFM back to the unit based on return duct static. Therefore, with a return fan system, the supply fan ordinarily requires less horsepower than a system with an exhaust fan.

Exhaust/Return Fan Systems

- Barometric relief
- 50% exhaust air fan option
- 100% modulating exhaust with Statitrac direct space sensing building pressurization control (with or without exhaust variable frequency drives)
- 100% modulating exhaust without Statitrac
- 100% modulating plenum return airfoil fan with Statitrac direct space sensing building pressurization control with variable frequency drive
- 100% modulating plenum return airfoil fan without Statitrac
- Drivers for applying either return or exhaust fan systems include economy, building pressure control, code requirements, and generally accepted engineering practices

Barometric Relief Dampers

This approach uses non-motorized, gravity-operated relief dampers that are located in the return-air section of the rooftop unit. When the building pressure increases, the pressure inside the return-air section also increases, eventually forcing open the relief dampers and allowing air to leave the building.

Barometric relief dampers are typically used in small buildings that use an open ceiling plenum for the return-air path. They are relatively inexpensive and require no sensors or controls, but they may require the building pressure to increase significantly before relieving sufficient airflow.

50% Exhaust System

The 50 percent exhaust system is a single FC exhaust fan with half the air moving capabilities of the supply fan system. It is Trane’s experience that a non-modulating exhaust system selected for 40 to 50 percent of nominal supply CFM can be applied successfully. The 50 percent exhaust system generally should not be selected for more than 40 to 50 percent of design supply airflow. Since it is an on/off non-modulating system, it does not vary exhaust CFM with the amount of outside air entering the building. Therefore, if selected for more than 40 to 50 percent of supply airflow, the building may become under-pressurized when economizer operation is allowing lesser amounts of outdoor air into the building. If, however, building pressure is not of a critical nature, the non-modulating exhaust system may be sized for more than 50 percent of design.

100% Modulating Exhaust with Statitrac™ Control, Constant Volume (CV) and Variable Air Volume (VAV) Units

For both CV and VAV rooftops, the 100% modulating exhaust discharge dampers (or VFD) are modulated in response to building pressure. A differential pressure control system, Statitrac, uses a differential pressure transducer to compare indoor building pressure to atmospheric pressure. The FC exhaust fan is turned on when required to lower building static pressure to setpoint. The Statitrac control system then modulates the discharge dampers (or VFD) to control the building pressure to within the adjustable, specified deadband that is set at the Human Interface Panel. Economizer and return air dampers are modulated independent of the exhaust dampers (or VFD) based on ventilation control and economizer cooling requests.

Advantages:

- The exhaust fan runs only when needed to lower building static pressure.
- Statitrac compensates for pressure variations within the building from remote exhaust fans and makeup air units.
- The exhaust fan discharges in a single direction resulting in more efficient fan operation compared to return fan systems.
- When discharge dampers are utilized to modulate the exhaust airflow, the exhaust fan may be running unloaded whenever the economizer dampers are less than 100% open.

The Trane 100% modulating exhaust system with Statitrac provides efficient control of building pressure in most applications simply because 100 percent modulating exhaust discharge dampers (or VFD) are controlled directly from building pressure, rather than from an indirect indicator of building pressure, such as outdoor air damper position.

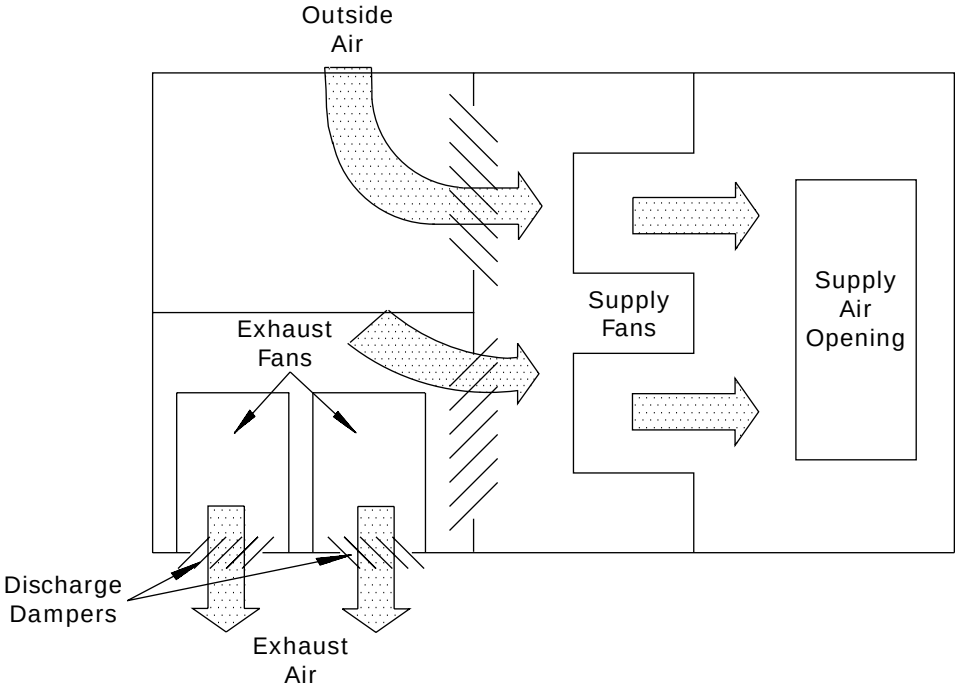
100% Modulating Exhaust System without Statitrac, Constant Volume (CV) Units Only

This fan system has performance capabilities equal to the supply fan. The FC exhaust fans are started by the economizer's outdoor air damper position and the exhaust dampers track the economizer outdoor air damper position. The amount of air exhausted by this fan is controlled by modulating discharge dampers at the fan outlet. The discharge damper position is controlled by a signal that varies with the position of the economizer dampers. When the exhaust fans start, the modulating discharge dampers are fully closed, and exhaust airflow is 15 to 20% of total exhaust capabilities. The Trane 100 percent modulating exhaust system provides excellent linear control of building exhaust in most applications where maintaining building pressure is not important.

Advantages:

- The exhaust fan runs only when the economizer reaches the desired exhaust enable point.
- Exhaust dampers are modulated based on the economizer position.
- When discharge dampers are utilized to modulate the exhaust airflow, the exhaust fan may be running unloaded whenever the economizer dampers are less than 100 percent open.

Figure 9. Plan view of modulating 100-percent exhaust system



100% Modulating Exhaust with or without Statitrac Control, SZVAV Units

The overall scheme will remain very similar to non-Single Zone VAV units with Space Pressure Control with the exception of the dynamic Exhaust Enable Setpoint.

For SZVAV the user will select an Exhaust Enable Setpoint during the 100% Fan Speed Command. Once selected, the difference between the Exhaust Enable Setpoint and Design OA Damper Minimum Position at 100% Fan Speed Command will be calculated. The difference calculated will be used as an offset to be added to the Active Building Design OA Minimum Position Target to calculate the dynamic Exhaust Enable Target to be used throughout the Supply Fan Speed/OA Damper Position range.

Advantages:

- The exhaust fan runs only when the economizer reaches the desired exhaust enable point.
- Exhaust dampers are modulated based on the economizer position.
- The exhaust fan discharges in a single direction resulting in more efficient fan operation compared to return fan systems.
- When discharge dampers are utilized to modulate the exhaust airflow, the exhaust fan may be running unloaded whenever the economizer dampers are less than 100% open.

The Trane 100% modulating exhaust system provides excellent linear control of building exhaust in most applications where maintaining building pressure is not important.

100% Modulating Return Fan Systems with Statitrac Control, Constant Volume (CV) and Variable Air Volume (VAV) Units

For both CV and VAV applications, the IntelliPak 2 rooftop unit offers 100% modulating return fan systems. A differential pressure control system, Statitrac, uses a differential pressure transducer to compare indoor building pressure to atmospheric pressure.

The return fan exhaust dampers are modulated, based on space pressure, to control the building pressure to within the adjustable, specified deadband that is set at the Human Interface Panel. A VFD modulates the return fan speed based on return duct static pressure.

Economizer and return air dampers are modulated independent of the exhaust dampers based on ventilation control and economizer cooling requests.

Advantages:

- The return fan operates independently of the supply fan to provide proper balance throughout the airflow envelope.
- Statitrac compensates for pressure variations within the building from remote exhaust fans and makeup air units.
- The return fan acts as both exhaust and return fan based on operation requirements.

The Trane 100% modulating return system with Statitrac provides efficient control of building pressure in applications with higher return duct static pressure and applications requiring duct returns. Exhaust discharge dampers are controlled directly from building pressure, return fan VFD is controlled from return static pressure, and return/economizer dampers are controlled based on ventilation control and economizer cooling requests.

100% Modulating Return Fan without Statitrac Control, Constant Volume (CV) Units Only

The return fan runs continuously while the supply fan is energized. The exhaust discharge dampers are modulated in response to building pressure. Economizer and return air dampers are modulated independent of the exhaust dampers based on ventilation control, and economizer cooling requests.

Advantages:

- The return fan enhances total system static capability.
- The return fan discharges in two directions, thereby balancing exhaust and unit return air volumes.

Clearance Requirements

The recommended clearances identified in unit dimensions should be maintained to assure adequate service capability, maximum capacity and peak operating efficiency. A reduction in unit clearance could result in condenser coil starvation or warm condenser air recirculation. If the clearances shown are not possible on a particular job, consider the following:

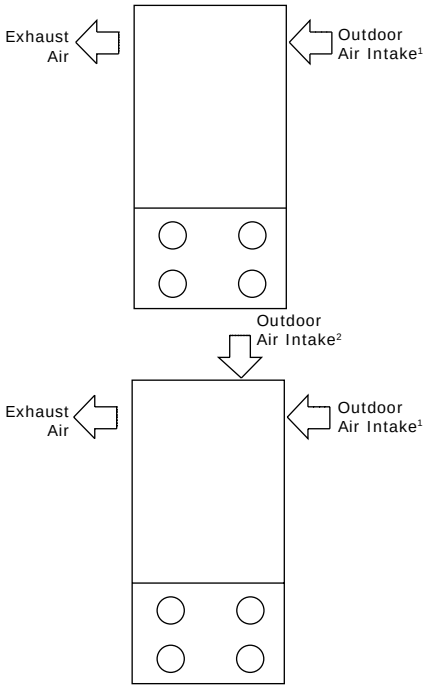
- Do the clearances available allow for major service work such as changing compressors or coils?
- Do the clearances available allow for proper outside air intake, exhaust air removal and condenser airflow?
- If screening around the unit is being used, is there a possibility of air recirculation from the exhaust to the outside air intake or from condenser exhaust to condenser intake?
- Do clearances meet all applicable codes?

Actual clearances which appear inadequate should be reviewed with a local Trane sales engineer.

When two or more units are to be placed side by side, the distance between the units should be increased to 150 percent of the recommended single unit clearance. The units should also be staggered, see and Figure 10, p. 41, for the following reasons:

- To reduce span deflection if more than one unit is placed on a single span. Reducing deflection discourages sound transmission.
- To assure proper diffusion of exhaust air before contact with the outside air intake of adjacent unit.

Figure 10. Unit placement



Note: *20-40 ton air-cooled models have only one outdoor air intake. 50-75 ton air-cooled models have two outdoor air intakes. 90-130 ton models have two outdoor air intakes on the backside of the unit and one small air intake at the end of the unit.*

Horizontal Supply and Return

The typical rooftop installation has both the supply and return air paths routed through the roof curb and building roof. However, many rooftop installations require horizontal supply and/or return from the rooftop because of a building's unique design or for acoustic considerations.

Trane has two ways to accomplish horizontal supply and/or return. The first method is through special field supplied curbs that use the unit's standard discharge and return openings. The supply and return air is routed through the curb to horizontal openings on the sides of the curb. The second method available for horizontal supply and return applies to 20-75 tons SXHL, SFHL, SLHL, SSHL, and 90-130 tons SXHK, SLHK, and SSHK design units. With this method the standard discharge and return openings are blocked. Access panels are removed as indicated in Figure 11, p. 42. These openings are used for the discharge and return. No special curb is needed.

When using an IntelliPak™ rooftop for horizontal supply and return, an additional pressure drop must be added to the supply external static to account for the 90 degree turn by the air. This additional pressure drop depends on airflow and rooftop size, but a range of 0.10 inches to 0.30 inches can be expected. The openings on the rooftop all have a one inch lip around the perimeter to facilitate ductwork attachment. If exhaust/return fans are being used on an IntelliPak™ rooftop unit with horizontal return, provisions should be made for accessing the exhaust components, since the access door opening is now being used as a return. The return ductwork attachment to the rooftop can include a section of removable duct. Use the dimensions provided and the supply and exhaust cfm to calculate the velocity (ft/min) through the openings.

Note: *Horizontal return with a return fan must be handled through design specials. Fan airflow cannot be field converted.*

20 to 75 Ton Units

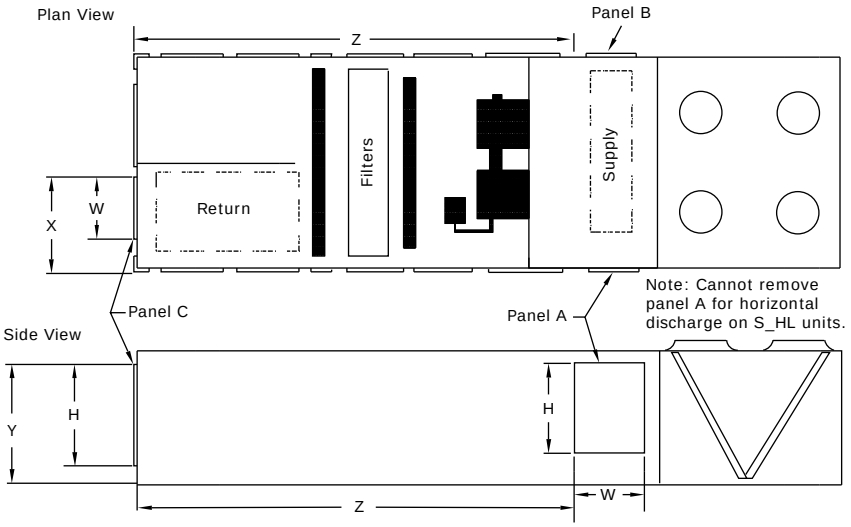
Figure 2, p. 11 is a simplified sketch of the rooftop showing which panels can be used for horizontal supply and/or return. To supply air horizontally, the panels that normally house the heat accessory controls (Panel A) and the gas heat barometric dampers (Panel B) can be removed

and either of the openings used as a unit discharge (see note 1). To return air horizontally, the exhaust fan access door (Panel C) can be removed and used as a return opening. Table 3, p. 42, Table 4, p. 43, and Table 5, p. 43 show dimensions for those panels (see note 4).

Note: *Horizontal discharge cannot be applied to SFHL 20-55 ton units with DDP fan.*

The SXHL (extended casing cooling only), SFHL (gas heat), SSHL (steam heat), and SLHL (hot water heat) rooftops can be factory modified for horizontal supply and return air without the use of a horizontal supply/return curb. To supply air horizontally on SXHL only, the panels that normally house the heat accessory controls (Panel A) and the gas heat barometric dampers (Panel B) can be removed and either of the openings used as a unit discharge. To return air horizontally, the exhaust fan access door (Panel C) can be removed and used as a return opening (see note 4).

Figure 11. Horizontal discharge panel dimensions – SXHL, SFHL, SLHL, SSHL units (ton)



Notes:

1. *For horizontal discharge on SFHL, SLHL and SSHL units, only the Panel B can be removed. Panel A cannot be used due to the location of the heating piping and components.*
2. *Add an extra 0.20-inches pressure drop to the supply external static to account for the extra turn the air is making.*
3. *The openings all have a 1.25-inch lip around the perimeter to facilitate ductwork attachment.*
4. *If exhaust fans are being used, provisions should be made for access to the exhaust components, since the access door is now being used as a return.*
5. *Use the dimensions provided and the supply cfm to calculate the velocity (ft/min) through the openings to be sure they are acceptable coils.*

Table 3. SXHL, SFHL, SSHL, SLHL – Panel A and B dimensions

Model	H (in.)[a]	W (in.)[a]	Total Area (H x W)	
			(in.^{2})	(ft^2)
S*HL *20	40.7	25.5	1038	7.2
S*HL *25	40.7	25.5	1038	7.2
S*HL *30	52.7	25.5	1344	9.3
S*HL *40	64.5	34.5	2225	15.5
S*HL *50	76.7	34.5	2646	18.4

Table 3. SXHL, SFHL, SSHL, SLHL – Panel A and B dimensions (continued)

Model	H (in.)[a]	W (in.)[a]	Total Area (H x W)	
			(in.^{2})	(ft^2)
S*HL *55	76.7	34.5	2646	18.4
S*HL *60	64.6	34.5	2229	15.5
S*HL *70	64.6	34.5	2229	15.5
S*HL *75	64.6	34.5	2229	15.5

Note: * = Universal letter/number. See model number for specifics.

[a] Dimensions include a 1/25 inch lip around perimeter. See Horizontal discharge panel dimensions, Note 3.

Table 4. SXHL, SFHL, SSHL, SLHL – Panel C dimensions

Model	H (in.)[a]	W (in.)[a]	Total Area (H x W)	
			(in.^{2})	(ft^2)
S*HL *20	40.7	34.5	1404	9.8
S*HL *25	40.7	34.5	1404	9.8
S*HL *30	52.7	34.5	1818	12.6
S*HL *40	64.5	34.5	2225	15.5
S*HL *50	76.7	34.5	2646	18.4
S*HL *55	76.7	34.5	2646	18.4
S*HL *60	64.6	34.5	2229	15.5
S*HL *70	64.6	34.5	2229	15.5
S*HL 75	64.6	34.5	2229	15.5

Note: * = Universal letter/number. See model number for specifics.

[a] Dimensions include a 1/25 inch lip around perimeter. See Horizontal discharge panel dimensions, Note 3.

Table 5. SXHL, SFHL, SSHL, SLHL – X, Y, and Z dimensions

Model	X (in.)	Y (in.)	Z (in.)
S*HL *20	43.5	44.0	201.5
S*HL *25	43.5	44.0	201.5
S*HL *30	43.5	56.0	201.5
S*HL *40	44.5	67.8	237.0
S*HL *50	44.5	80.0	237.0
S*HL *55	44.5	80.0	237.0
S*HL *60	44.5	68.0	237.5
S*HL *70	44.5	68.0	237.5
S*HL 75	44.5	68.0	237.5

Note: * = Universal letter/number. See model number for specifics.

90 to 130 Ton Units

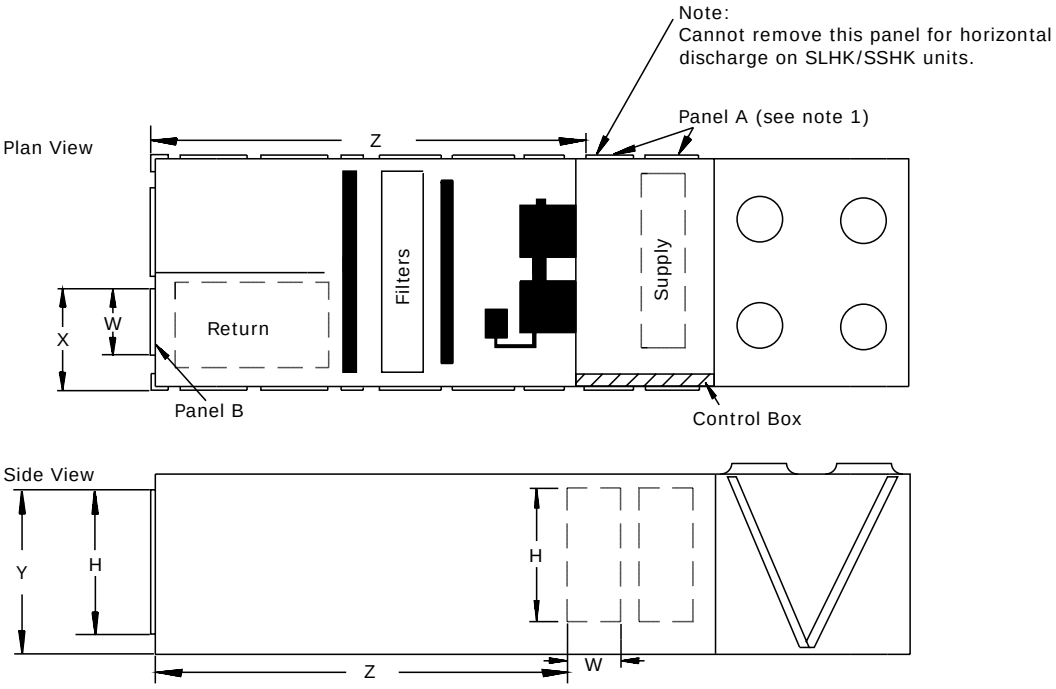
Figure 3, p. 12 is a simplified sketch showing which panels can be used for horizontal supply and/or return. On 90 to 130 ton units, only one side of the extended casing may be used for horizontal supply because of the location of the unit control panel. There are, however, two panels on SXHK models (Panels A) on the side opposite the control box that can be removed along with the vertical support, which separates the two. Removal of the vertical support is optional, but will

ensure maximum airflow. On SLHK and SSHK models, only one of the Panel As can be used for horizontal supply because of the location of the heating coil. Horizontal return is accomplished in much the same way as on S*HLs by removing the exhaust fan access door (Panel B). See Table 6, p. 45 and Table 7, p. 45 for S*HK panel dimensions (see note 4).

The SXHK, SLHK, SSHK rooftops can be factory modified to supply and return air horizontally without the use of a horizontal supply/return curb. To supply air horizontally, use panel A only. The panel on the opposite side cannot be used due to the location of the unit control panel. SXHK rooftop air conditioners do not have a panel configuration like the 20-89 ton rooftops.

To achieve maximum airflow, vertical support can be removed after the unit has been placed on the roof curb. It is secured by four screws. (See note 1) For horizontal discharge on SLHK and SSHK units, only the panel A next to the condenser fan section can be removed. The other panel A next to the supply fan cannot be used due to the location of the heating coils. To return air horizontally, the exhaust fan access door (panel B) can be removed and used as a return opening (see note 4).

Figure 12. Horizontal discharge panel dimensions – 90 to 130 tons SXHK, SLHK, SSHK units



Notes:

1. *SXHK units have two Panel As that can be removed. Once unit is installed, the panel(s) and the 6½-inch vertical support channel in between can be removed.*
2. *Add an extra 0.20-inches pressure drop to the supply external static to account for the extra turn the air is making.*
3. *The openings all have a 1.25-inch lip around the perimeter to facilitate ductwork attachment.*
4. *If exhaust/return fans are being used, provisions should be made for access to the exhaust components, since the access door is now being used as a return.*
5. *Use the dimensions provided and the supply cfm to calculate the velocity (ft/min) through the openings to be sure they are acceptable coils.*

Table 6. SXHK, SLHK, SSHK - Panel A and B dimensions

Panel	H (in.)	W (in.)	Total Area (H X W)	
			($in.^2$)	(ft^2)
A	72.7	27.5	1999	13.9
B	72.7	32.0	2508	17.4

Table 7. SXHK, SLHK, SSHK - X, Y, Z dimensions

Model	X (in.)	Y (in.)	Z (in.)
S*HK 90-130	69.0	77.8	244.7

Note: * = X, L, or S

Seismic Requirements

For sites that have seismic requirements, certain IntelliPak configurations are able to meet IBC 2012 seismic compliance. Testing of the IntelliPak was performed in accordance with the following documents and regulations:

- 2012 International Building Code (IBC)
- ICC AC-156 2012, "Acceptance Criteria for Seismic Certification by Shake-Table Testing of Non-Structural Components."

Contact your Trane representative for more detail.

Acoustic Considerations

The best time to make provisions to reduce sound transmission to the occupied space is during the project design phase. Proper placement of rooftop equipment is critical to reducing sound transmitted into the building. The most economical means of avoiding an acoustical problem is to locate rooftop equipment away from acoustically-sensitive areas. If possible, locate rooftop equipment above corridors, utility rooms, restrooms, or other areas where higher sound levels are acceptable.

It is not possible to totally quantify the effect of the building structure on sound transmission, since this depends on the response of the roof and building members to the sound and vibration of the unit components. However, the following guidelines have been proven through experience to help reduce sound transmission through the building structure:

- Never cantilever the condensing section of the rooftop unit; a structural cross member must support this end of the unit.
- Locate the unit's center of gravity close to (or over) a column or main support beam to minimize roof deflection and vibration-related noise.
- If the roof structure is very light, roof joists should be replaced by a structural shape in the critical areas described above.
- If several units are to be placed on one span, they should be staggered to reduce deflection over that span.

For more information:

- ASHRAE. 2015. *ASHRAE Handbook – HVAC Applications* (Chapter 48: Noise and Vibration Control). Atlanta, GA: ASHRAE.
- ASHRAE. 2011. *Practical Guide to Noise and Vibration Control for HVAC Systems*. Atlanta, GA: ASHRAE.
- Guckelberger, D. 2000. "Controlling Noise From Large Rooftop Units," *ASHRAE Journal* (May): pp. 55-62.
- Trane. Guckelberger, D. and Bradley, B. 2006. *Acoustics in Air Conditioning*, ISS-APM001-EN. La Crosse, WI: Inland Printing Company.

- Trane. Murphy, J. and Harshaw, J. 2012. *Rooftop VAV Systems*, SYS-APM007-EN. La Crosse, WI: Inland Printing Company.

In addition, the Trane TAP™ Acoustics Program allows for modeling of various sound paths to predict sound levels in the occupied space. The software models airborne sound from supply- and return-air paths, as well as duct breakout and roof transmission sound, so that the designer can identify potential sound problems and make design alterations before equipment installation. TAP is also capable of modeling the effect of outdoor sound on adjacent properties. This program is available from Trane's Customer Direct Service Network (C.D.S.), ask your local Trane representative for additional information.

Corrosive Atmospheres

Trane's IntelliPak™ Rooftops are designed and built to industrial standards and will perform to those standards for an extended period depending on the hours of use, the quality of maintenance performed, and the regularity of that maintenance.

One factor that can have an adverse effect on unit life is operation in a corrosive environment. Since the Microchannel condenser coil is an all-aluminum design, it provides a high level of corrosion protection on its own. Uncoated, it withstands a salt spray test in accordance with ASTM B117 for 1,000 hours. When rooftops are operated in highly corrosive environments, Trane recommends the corrosion protected condenser coil option.

This corrosion protection option meets the most stringent testing in the industry, including ASTM B117 Salt Spray test for 6,000 hours and ASTM G85 A2 Cyclic Acidified Salt Fog test for 2,400 hours. The acid fog test is the most stringent available today. This coating is added after coil construction covering all tubes, headers, fins and edges. The design provides superior protection from any corrosive agent. For evaporator coils, copper fins or epoxy coating can be utilized as a design special.

IntelliPak paint innately handles harsh weather, including most coastal and salt environments and direct sun. The unit paint was salt spray tested in accordance with ASTM B117 and UV weathering resistance tested in accordance with ASTM G155 Test cycle 1 for 2000 hours. For further detail on the paint testing, refer to PROD-SLB034*-EN

Note: *Field coating is not allowed on Microchannel coils.*

Ventilation Override Sequences

One of the benefits of using an exhaust fan rather than a return fan, in addition to the benefits of lower energy usage and improved building pressurization control, is that the rooftop can be used as part of a ventilation override system. Several types of sequences can be easily done when exhaust fans are a part of the rooftop system.

What would initiate the ventilation override control sequence? Typically, a manual switch is used and located near the fire protection control panel. This enables the fire department access to the control for use during or after a fire. It is also possible to initiate the sequence from a field-installed automatic smoke detector. In either case, a contact closure begins the ventilation override control sequence.

Trane can provide five (5) different ventilation override sequences on both CV and VAV IntelliPak™ rooftops. For convenience, the sequences are factory preset but are fully field edited from the Human Interface Panel or Tracer. Any or all five sequences may be “locked” in by the user at the Human Interface Panel.

The user can customize up to five (5) different override sequences for purposes such as smoke control. The following parameters within the unit can be defined for each of the five sequences:

- Supply Fan - on/off
- Variable Frequency Drives - on (60 Hz)/off (0 Hz)/controlling
- Exhaust/Return Fan - on/off
- Exhaust Dampers - open/closed
- Economizer Dampers - open/closed
- Heat - off/controlling (output for) VAV Boxes - open/controlling

Compressors and condenser fans are shut down for any Ventilation Override sequence. Factory preset sequences include unit Off, Exhaust, Purge, Purge with duct pressure control, and Pressurization. Any of the user-defined Ventilation Override sequences can be initiated by closing a field supplied switch or contacts connected to an input on the Ventilation Override Module. If more than one ventilation override sequence is being requested, the sequence with the highest priority is initiated. Refer to the Ventilation Override Mode (VOM) information in the Control section of this catalog for more details on each override sequence.

Natural Gas Heating Considerations

Trane uses heavy gauge stainless steel throughout the construction of its natural gas tubular exchangers. These heat exchangers can be applied with confidence, particularly with full modulation control, when mixed air temperatures are below 50°F, and low ambient temperatures can cause condensation to form on the heat exchanger. The IntelliPak™ natural gas heat exchangers are not recommended for applications with mixed air conditions entering the heat exchanger below 30°F to ensure adequate leaving air heating temperature.

High Entering Return Temperature Applications

Some applications may have high entering return temperatures. It is recommended that the dry bulb temperatures in any application not exceed 95°F for extended periods of time. If this is a requirement, please work with the Applications or Product Support group in developing a specific assessment. Other factors, such as wet bulb and ambient temperatures, will also affect the system's reaction.

Modulating Hot Gas Reheat

Often supply fan VAV modulation, staged compressor control, or the addition of an eFlex™ variable speed compressor are sufficient in handling building humidity in a wide range of indoor load conditions. Applications where non-peak load conditions can be dominated by latent loads are candidates for the Hot Gas Reheat option. This includes many applications subject to ASHRAE Standard 62 requirements.

When a Hot Gas Reheat coil is energized, it increases the air temperature after exiting the evaporator coil. While this provides dehumidification, this is not a dehumidifier. The main function of the Packaged RTU is to provide zone temperature control. For times when dehumidification is needed, the hot gas reheat will be energized.

Applications which should be investigated before using the standard modulating hot gas reheat option, and will require additional investigation include the following:

- Process applications
- Units utilized as a make-up air or 100% outside air units
- Zones with dramatically varying load conditions (sanctuaries, locker rooms, gymnasiums, etc.

Generally, the standard Modulating Hot Gas Reheat option requires a call for cooling to initiate. If there is no call for cooling, and there is a desire for dehumidification, another solution will need to be investigated. The IntelliPak™ packaged rooftop systems include non-standard solutions which can be considered for these types of applications.

Low Ambient Operation — Remote Human Interface Recommendation

Who wants to be on a roof at subzero temperatures? We can understand a service technician's reluctance to do this; that's why we offer a remote mounted human interface panel. The service technician can troubleshoot and diagnose in the comfort of a mechanical room.

IntelliPak™ Replacement Unit (IRU)

This option must be included when replacing an existing R-22 IntelliPak™ unit with the current R-410A design and is also applied when using a full perimeter curb with isolation. The IntelliPak™ rooftop replacement engineering bulletin RT-PRB027-EN provides more detail on this.

Selection Procedure

This section outlines a step-by-step procedure that may be used to select a Trane air-cooled single-zone air conditioner. Air-cooled models should be selected based on dry bulb (DB) conditions. For specific model selection, utilize TOPSS or contact the local Trane Sales Office. This sample selection is based on the following conditions:

Summer Design	
Summer outdoor design conditions	95 DB/76 WB ambient temperature
Summer room design conditions	78 DB/64 WB
Total cooling load	430 MBh (35.8 tons)
Sensible cooling load	345 MBh (28.8 tons)
Outdoor air ventilation load	66.9 MBh
Return air temperature	80 DB/65 WB
Winter design:	
Winter outdoor design conditions	0°F
Return air temperature	70°F
Total heating load	475 MBh
Winter outdoor air ventilation load	133 MBh
Air delivery data:	
Supply fan CFM	17,500 CFM
External duct static pressure	1.2 in wg
Minimum outdoor air ventilation	1,750 CFM
Exhaust/Return fan CFM	12,000 CFM
Return air duct negative static pressure	0.65 in wg
Electrical characteristics:	
Voltage/cycle/phase	460/60/3
Unit Accessories	• Gas fired heat exchanger - high heat module • Throwaway filters • Economizer • Modulating 100% exhaust/return fan

Cooling Capacity Selection

1. Determine nominal unit size selection

   A summation of the peak cooling load and the outside air ventilation load shows: 430 MBh + 66.9 MBh = 496.9 MBh required unit capacity. Table 59, p. 124, a 50 ton unit capacity with standard capacity evaporator coil at 80 DB/65WB, 95°F outdoor air temperature and 17,500 total supply CFM is 581 MBh total and 430 MBh sensible. Thus, a nominal 50 ton unit with standard capacity is selected.

2. Determine evaporator coil entering conditions

   Mixed air dry bulb temperature determination:

   Using the minimum percent of OA (1,750 CFM ÷ 17,500 CFM = 10 percent), determine the mixture dry bulb to the evaporator.

   RADB + % OA (OADB - RADB) = 80 + (0.10) (95 - 80) = 80 + 1.5 = 81.5°F

   Approximate wet bulb mixture temperature:

AWB + % OA (OAWB - RAWB) = 65 + (0.10) (76 - 65) = 65 + 1.1 = 66.1°F

3. Determine supply fan motor heat gain

   Having selected a nominal 50 ton unit, the supply fan bhp can be calculated. The supply fan motor heat gain must be considered in final determination of unit capacity.

   Determine unit total static pressure (Table 59, p. 124) at design supply CFM:

Table 8. Determine unit total static pressure at design supply CFM

Supply Air Fan	
Supply Duct Static Pressure	1.20 inches
Evaporator Coil	0.60 inches
Return Duct Negative Static Pressure	0.65 inches
Heat Exchanger	0.31 inches
Throwaway Filter	0.10 inches
Economizer w/ Exhaust Fan	0.12 inches
Trane® Roof Curb	0.13 inches
Unit Total Static Pressure	3.11 inches

   Using total of 17,500 CFM and total static pressure of 3.11 inches, estimate the bhp and rpm using the fan curve in Figure 21, p. 111, for an FC fan. The bhp is 16 at 989 rpm. Similarly, a DDP fan can be selected using Figure 25, p. 115, or Figure 26, p. 116.

   From , p. 50, supply fan motor heat gain = 44 MBh.

4. Determine total required cooling capacity

   Required capacity = Total peak load + OA load + supply air fan motor heat.

   Required capacity = 430 + 66.9 + 44 = 540.9 MBh (45.1 tons)

5. Determine unit capacity

   From Table 28, p. 78, unit capacity at 81.5 DB/66.1WB entering the evaporator, 17,500 supply air CFM, 95°F outdoor ambient, is 575 MBh (47.9 tons) with 475 MBh sensible.

6. Determine leaving air temperature

   Unit sensible heat capacity corrected for supply air fan motor heat = 475 MBh - 44 MBh = 431 MBh. Supply air dry bulb temperature difference =

$$\frac{\text{Sensible Btu}}{1.085 \times \text{Supply CFM}} =$$

   431 MBh ÷ (1.085 x 17,500 CFM) = 22.7°F

   Supply air dry bulb = 81.5 DB - 22.7 = 58.8°F

   Unit enthalpy difference =

$$\frac{\text{Total Btu}}{4.5 \times \text{Supply CFM}} =$$

   575 MBh ÷ (4.5 x 17,500 CFM) = 7.3 Btu/lb

   Leaving enthalpy = h(ent WB) - h(diff). From Table 11, p. 48 h(ent WB) = 30.9 Btu/lb

   Leaving enthalpy = 30.9 Btu/lb - 7.3 Btu/lb = 23.6 Btu/lb

   Supply air wet bulb = 55.6

   Leaving air temperature = 59.2 DB/55.6WB

Heating Capacity Selection

1. Determine air temperature entering heating module

   Mixed air temperature = RADB + % OA (OADB - RADB) = 70 + (0.10) (0 - 70) = 63°F

   Supply air fan motor heat temperature rise = 51,900 Btu ÷ (1.085 x 17,500 CFM) = 2.73°F

   Air temperature entering heating module = 63.0 + 2.73 = 65.7°F

2. Determine total winter heating load

   Total winter heating load = peak heating load + ventilation load - supply fan motor heat = 475 + 133 - 51.9 = 556.1 MBh

   a. Electric heating system

      Unit operating on 460/60/3 power supply.

      From Table 57, p. 103, kW may be selected for a nominal 50 ton unit operating 460-volt power. The 170 kW heat module (580.1 MBh) will satisfy the winter heating load of 563 MBh.

      Unit supply temperature at design heating conditions = mixed air temperature + air temperature rise = 65.7°F + 30.6°F = 96.3°F.

      Table 55, p. 103 shows an air temperature rise of 30.6°F for 17,500 CFM through the 170 kW heat module.

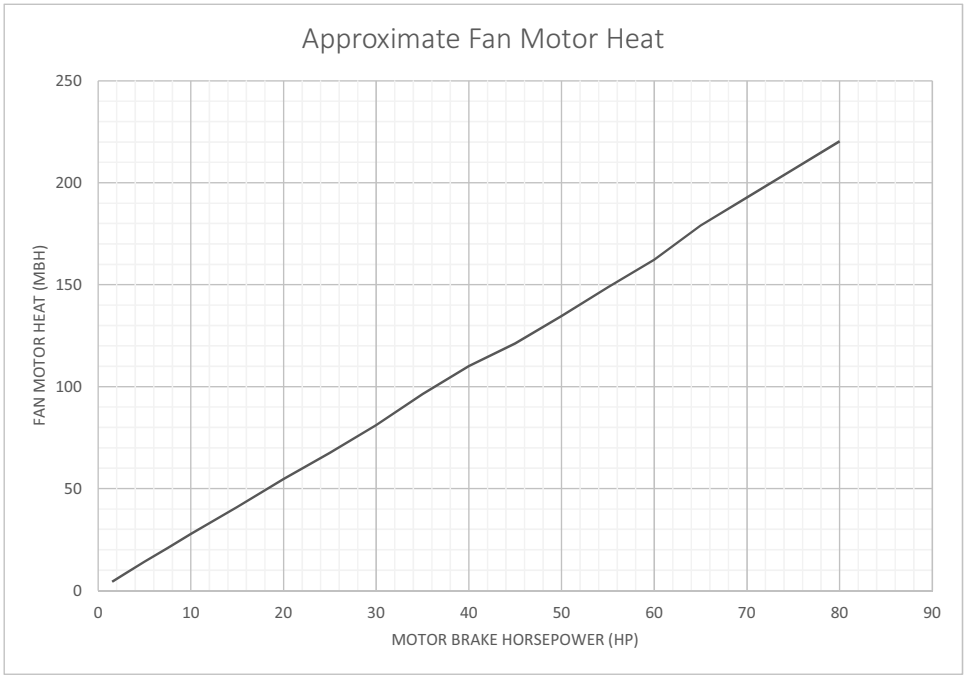
   b. Gas heating system (natural gas)

      From Table 51, p. 101 select the high heat module (680 MBh output) to satisfy winter heating load of 563 MBh at unit CFM.

      Table 51, p. 101 also shows an air temperature rise of 35.0°F for 17,500 CFM through the heating module.

      Unit supply temperature at design heating conditions = mixed air temperature + air temperature rise = 65.7°F + 35.0°F = 100.7°F.

Figure 13. Fan motor



   c. Hot water heating

      Assume a hot water supply temperature of 190°F. Subtract the mixed air temperature from the hot water temperature to determine the ITD (initial temperature difference).

ITD = 190°F - 65.7°F = 126°F. Divide the winter heating load by ITD = 563 MBh ÷ 126°F = 4.50 Q/ITD.

From Table 58, p. 104, select the low heat module. By interpolation, a Q/ITD of 4.50 can be obtained at a gpm at 25.7.

Water pressure drop at 25.7 gpm is 0.57 ft. of water. Heat module temperature rise is determined by:

$$\frac{\text{Total Btu}}{1.085 \times \text{Supply CFM}} = \Delta T$$

$$\frac{563{,}000}{1.085 \times 17{,}500} = 29.7°F$$

Unit supply air temperature = mixed air temperature + air temperature rise = 65.7 + 29.7 = 95°F.

d. Steam heating system

Assume a 15 psig steam supply.

From Table 54, p. 102, the saturated temperature steam is 250°F. Subtract mixed air temperature from the steam temperature to determine ITD. ITD = 250°F - 65.7°F = 186°F.

Divide winter heating load by ITD = 563 MBh ÷ 186°F = 3.03 Q/ITD.

From Table 53, p. 102, select the high heat module. The high heat module at 17,500 CFM has a Q/ITD = 5.11.

Heat module capacity, Q = ITD x Q/ITD = 186 F x 5.11 Q/ITD = 950 MBh

Heat module air temperature rise

$$\frac{\text{Total Btu}}{1.085 \times \text{Supply CFM}} = \Delta T$$

945 Btu ÷ (1.085 x 17,500 CFM) = 50°F.

Unit supply temperature at design conditions = mixed air temperature + air temperature rise = 65.1°F + 50°F = 116°F.

Air Delivery Procedure

Supply fan performance curves include internal resistance of rooftop. For total static pressure determination, system external static must be added to appropriate component static pressure drop (evaporator coil, filters, optional economizer, optional exhaust fan, optional heating system, optional cooling only extended casing, optional roof curb).

Supply Fan Motor Sizing

The supply fan motor selected in the cooling capacity determination was 16 bhp and 989 rpm. Thus, a 20 hp supply fan motor is selected. For an FC fan selection, enter Table 69, p. 129 to select the proper drive. For a 50 ton rooftop with 20 hp motor, a drive number A - 1000 rpm is selected.

Exhaust Fan Motor Sizing

The exhaust fan is selected based on total return system negative static pressure and exhaust fan CFM. Return system negative static include return duct static and roof curb static pressure drop.

Return duct static pressure = 0.65 inches

Trane® roof curb (Table 59, p. 124) = 0.12 inches

Total return system negative static pressure = 0.77 inches

Exhaust fan CFM = 12,000 CFM

From, the required bhp is 3.45 hp at 574 rpm. Thus, the exhaust fan motor selected is 5 hp.

To select a drive, enter Table 67, p. 129 for a 5 hp motor for a 50 ton unit. Drive selection number 6 - 600 rpm.

Where altitudes are significantly above sea level, use , and Table 17, p. 67 and Figure 14, p. 67 for applicable correction factors.

Return Fan Motor Sizing

The return fan is selected based on the return fan CFM and the total return system negative static pressure. The return system negative static includes the return duct static, the exhaust damper pressure drop, and any roof curb static pressure drop.

Since return fans handle all of the return static, supply fan motor sizing does not need to include this value. This feature is helpful if the supply motor HP is over the maximum limit and in some cases, can allow supply motor downsizing.

However, since the return fan runs continuously to handle all of the return static, the sensible heat generated by the motor must be included in the entering evaporator coil mixed temperature equation.

Return Duct Static Pressure = 0.65

Roof curb Static Pressure (Table 59, p. 124) = 0.12

Exhaust Damper Pressure Drop = 0.41

Total Return System Static Pressure = 1.18

Return Fan CFM = 12000

From Table 73, p. 130, the required bhp is 4.55. Thus the return fan is selected at 5HP. To select a drive, look at table Table 76, p. 132 for a 5HP return motor on a 50 HP unit. Drive selection number C - 1200.

Using , p. 50 for fan motor heat, motor heat for 4.55 BHP = 10.4 MBh

10.4 MBh / (1.085 x 12000 return fan CFM) = 0.80°F

0.80°F is added to the return air temperature

Modulating Hot Gas Reheat Selection

The hot gas reheat coil is designed to deliver maximum reheat temperatures. Contact the local Trane Sales Office or refer to the IntelliPak™ TOPSS™ selection program to determine leaving air temperature, latent capacity, reheat sensible capacity, leaving unit dew point, and moisture removal when the unit is in reheat operation. If the reheat set point is not obtainable at the provided conditions the customer will be required to make adjustments to the conditions or change the reheat set point value. Please note that reheat operation will not be allowed when there is a call for heating or more than 50% call for cooling.

Unit Electrical Requirements

Selection procedures for electrical requirements for wire sizing amps, maximum fuse sizing, and dual element fuses are given in the electrical service section of this catalog.

Altitude Corrections

The rooftop performance tables and curves of this catalog are based on standard air (.075 lbs/ft). If the rooftop airflow requirements are at other than standard conditions (sea level), an air density correction is needed to project accurate unit performance.

Figure 14, p. 67 shows the air density ratio at various temperatures and elevations. Trane® rooftops are designed to operate between 40 and 90 degrees Fahrenheit leaving air temperature. The procedure to use when selecting a supply or exhaust fan on a rooftop for elevations and temperatures other than standard is as follows:

1. First, determine the air density ratio using Figure 14, p. 67.

2. Divide the static pressure at the nonstandard condition by the air density ratio to obtain the corrected static pressure.
3. Use the actual CFM and the corrected static pressure to determine the fan rpm and bhp from the rooftop performance tables or curves.
4. The fan rpm is correct as selected.
5. Bhp must be multiplied by the air density ratio to obtain the actual operating bhp.

   In order to better illustrate this procedure, the following example is used:

   Consider a 60 ton rooftop unit that is to deliver 18,000 actual CFM at 3-inches total static pressure (tsp), 55°F leaving air temperature, at an elevation of 5,000 ft. From Figure 14, p. 67, the air density ratio is 0.86.

   The rpm is correct as selected - 906 rpm.

   From the performance tables: a 60 ton rooftop will deliver 18,000 CFM at 3.49-inches tsp at 992 rpm and 26.1 bhp.

   Tsp = 3.0-inches / 0.86 = 3.49 inches tsp.

   Bhp = 26.1 x 0.86 = 22.4 bhp actual.

   Compressor MBh, SHR, and kW should be calculated at standard and then converted to actual using the correction factors in . Apply these factors to the capacities selected at standard CFM so as to correct for the reduced mass flow rate across the condenser. Heat selections other than gas heat will not be affected by altitude. Nominal gas capacity (output) should be multiplied by the factors given in Table 17, p. 67 before calculating the heating supply air temperature.

Model Number Description

S*HL — 20 - 75 Ton, Air Cooled

Digit 1 — Unit Type

S = Self-Contained (Packaged Rooftop)

Digit 2 — Unit Function

A = DX Cooling, No Heat
E = DX Cooling, Electric Heat
F = DX Cooling, Natural Gas Heat
L = DX Cooling, Hot Water Heat
S = DX Cooling, Steam Heat
X = DX Cooling, No Heat, Extended Casing

Digit 3 — System Type

H = Single Zone

Digit 4 — Development Sequence

L = Sixth

Digit 5, 6, 7 — Nominal Capacity

***20** = 20 Ton Air Cooled
***25** = 25 Ton Air Cooled
***30** = 30 Ton Air Cooled
***40** = 40 Ton Air Cooled
***50** = 50 Ton Air Cooled
***55** = 55 Ton Air Cooled
***60** = 60 Ton Air Cooled
***70** = 70 Ton Air Cooled
***75** = 75 Ton Air Cooled

Digit 8 — Voltage Selection

4 = 460/60/3 XL
5 = 575/60/3 XL
E = 200/60/3 XL
F = 230/60/3 XL

Note: *SEHL units (units with electric heat) utilizing 208V or 230V require dual power source.*

Digit 9 — Heating Capacity

Note: *When the second digit is "F" (Gas Heat), the following applies: (M and T are available ONLY on 50 ton and above).*

H = High Heat — 2-Stage
K = Low Heat — Ultra Modulation
L = Low Heat — 2-Stage
M = Low Heat — 4 to 1 Modulation
0 = No Heat
P = High Heat — 4 to 1 Modulation
T = High Heat — Ultra Modulation

Note: *When the second digit is "E" (Electric Heat), the following applies:*

D = 30 kW
H = 50 kW
L = 70 kW
N = 90 kW
Q = 110 kW
R = 130 kW
U = 150 kW
V = 170 kW
W = 190 kW

Note: *When the second digit is "L" (Hot Water) or "S" (Steam) Heat, one of the following valve size values must be in Digit 9:*

High Heat Coil
1 = 0.50 inch
2 = 0.75 inch
3 = 1 inch
4 = 1.25 inches
5 = 1.5 inches
6 = 2 inches

Low Heat Coil
A = 0.50 inch
B = 0.75 inch
C = 1 inch
D = 1.25 inches
E = 1.5 inches
F = 2 inches

Digit 10 — Design Sequence

A = First (Factory Assigned)

Note: *Sequence may be any letter A thru Z, or any digit 1 thru 9.*

Digit 11— Exhaust/Return Option

0 = None
1 = Barometric
3 = 100% Exhaust 3 HP w/Statitrac
4 = 100% Exhaust 5 HP w/Statitrac
5 = 100% Exhaust 7.5 HP w/Statitrac
6 = 100% Exhaust 10 HP w/Statitrac
7 = 100% Exhaust 15 HP w/Statitrac
8 = 100% Exhaust 20 HP w/Statitrac
B = 50% Exhaust 3 HP
C = 50% Exhaust 5 HP
D = 50% Exhaust 7.5 HP
F = 100% Exhaust 3 HP w/o Statitrac (CV Only)
G = 100% Exhaust 5 HP w/o Statitrac (CV Only)
H = 100% Exhaust 7.5 HP w/o Statitrac (CV Only)
J = 100% Exhaust 10 HP w/o Statitrac (CV Only)
K = 100% Exhaust 15 HP w/o Statitrac (CV Only)
L = 100% Exhaust 20 HP w/o Statitrac (CV Only)
9 = 100% Return 3 HP w/Statitrac
M = 100% Return 5 HP w/Statitrac
N = 100% Return 7.5 HP w/Statitrac
P = 100% Return 10 HP w/Statitrac
R = 100% Return 15 HP w/Statitrac
T = 100% Return 20 HP w/Statitrac
U = 100% Return 3 HP w/o Statitrac (CV Only)
V = 100% Return 5 HP w/o Statitrac (CV Only)
W = 100% Return 7.5 HP w/o Statitrac (CV Only)
X = 100% Return 10 HP w/o Statitrac (CV Only)
Y = 100% Return 15 HP w/o Statitrac (CV Only)
Z = 100% Return 20 HP w/o Statitrac (CV Only)

Digit 12— Exhaust/Return Air Fan Drive

(Exhaust/Return Fan)
0 = None
4 = 400 RPM
5 = 500 RPM
6 = 600 RPM
7 = 700 RPM
8 = 800 RPM
9 = 900 RPM
A = 1000 RPM
B = 1100 RPM

Digit 12— Exhaust/Return Option (continued)

(Return Fan Only)
C = 1200 RPM
D = 1300 RPM
E = 1400 RPM
F = 1500 RPM
G = 1600 RPM
H = 1700 RPM
J = 1800 RPM
K = 1900 RPM

Digit 13 — Filter (Pre DX/Final)

A = Throwaway
B = Cleanable Wire Mesh
C = High Efficiency Throwaway
D = Bag with Prefilter
E = Cartridge with Prefilter
F = Throwaway Filter Rack (Filter not included)
G = Bag Filter Rack (Filter Not Included)
H = Standard Throwaway Filter/Cartridge Final Filters
J = High Efficiency Throwaway Filter/ Cartridge Final Filters
K = Bag Filters with 2–inch Throwaway Prefilters/Cartridge Final Filters
L = Cartridge Filters with 2–inch Throwaway Prefilters /Cartridge Final Filters
M = Standard Throwaway Filter/Cartridge Final Filters with 2"Throwaway Prefilters
N = High Efficiency Throwaway Filters/ Cartridge Final Filters with 2"Throwaway Prefilters
P = Bag Filters with Prefilters/Cartridge Final Filters with 2–inch Throwaway Prefilters
Q = Cartridge Filters with Prefilters/Cartridge Final Filters with 2–inch Throwaway Prefilters
R = High Efficiency Throwaway/Final filter rack (no filters)
T = 2 inch and 1 inch Vertical Filter Rack (no filters) /Final Filter Rack (no filters)

Digit 14 — Supply Air Fan HP

1 = 3 HP FC
2 = 5 HP FC
3 = 7.5 HP FC
4 = 10 HP FC
5 = 15 HP FC
6 = 20 HP FC
7 = 25 HP FC
8 = 30 HP FC
9 = 40 HP FC
A = 50 HP FC
B = 3 HP DDP 80W
C = 3 HP DDP 120W
D = 5 HP DDP 80W
E = 5 HP DDP 120W

Digit 14 — Supply Air Fan HP (continued)

F = 7.5 HP DDP 80W
G = 7.5 HP DDP 120W
H = 10 HP DDP 80W (60-89T = 2 x 5 HP)
J = 10 HP DDP 120W (60-89T = 2 x 5 HP)
K = 15 HP DDP 80W (60-89T = 2 x 7.5 HP)
L = 15 HP DDP 120W (60-89T = 2 x 7.5 HP)
M = 20 HP DDP 80W (60-89T = 2 x 10 HP)
N = 20 HP DDP 120W (60-89T = 2 x 10 HP)
P = 25 HP DDP 80W
R = 25 HP DDP 120W
T = 30 HP DDP 80W (60-89T = 2 x 15 HP)
U = 30 HP DDP 120W (60-89T = 2 x 15 HP)
V = 40 HP DDP 80W(60-89T = 2 x 20 HP)
W = 40 HP DDP 120W (60-89T = 2 x 20 HP)
X = 50 HP DDP 80W (70 and 75-89T = 2 x 25 HP)
Y = 50 HP DDP 120W (70 and 75-89T = 2 x 25 HP)
Z = 30 HP DDP 100W

Digit 15 — Supply Air Fan RPM

4 = 400 RPM
5 = 500 RPM
6 = 600 RPM
7 = 700 RPM
8 = 800 RPM
9 = 900 RPM
A = 1000 RPM
B = 1100 RPM
C = 1200 RPM
D = 1300 RPM
E = 1400 RPM
F = 1500 RPM
G = 1600 RPM
H = 1700 RPM
J = 1800 RPM
K = 1900 RPM
L = 2000 RPM
M = 2100 RPM
N = 2200 RPM
P = 2300 RPM
R = 2400 RPM

Digit 16 — Outside Air

A = No Fresh Air
B = 0-25% Manual
D = 0-100% Economizer
E = 0-100% Economizer w/ Traq/DCV
F = 0-100% Economizer w/DCV

Note: *Must install CO_2 sensor(s) for DCV to function properly.*

Digit 17 — System Control

1 = CV - Zone Temp Control
2 = CV - Discharge Temp Control
4 = CV - Zone Temp Control Space Pressure Control w/ Exhaust/Return VFD w/o Bypass
5 = CV - Zone Temp Control Space Pressure Control w/
Exhaust/Return VFD and Bypass
6 = VAV Discharge Temp Control w/ VFD w/o Bypass
7 = VAV Discharge Temp Control w/ VFD and Bypass
8 = VAV Discharge Temp Control Supply and Exhaust/Return Fan w/ VFD w/o Bypass
9 = VAV Discharge Temp Control Supply and Exhaust/Return Fan with VFD and Bypass
A = VAV - Single Zone VAV - w/VFD w/o Bypass
B = VAV - Single Zone VAV - w/VFD and Bypass
C = VAV - Single Zone VAV - Supply and Exhaust/Return Fan w/ VFD w/o Bypass
D = VAV - Single Zone VAV - Supply and Exhaust/Return Fan w/ VFD w/ Bypass

Digit 18 — Zone Sensor

0 = None
A = Dual Setpoint Manual or Auto Changeover (BAYSENS108*)
B = Dual Setpoint Manual or Auto Changeover w/ System Function Lights (BAYSENS110*)
C = Room Sensor w/ Override/Cancel Buttons (BAYSENS073*)
D = Room Sensor w/ Temp Adjustment/ Override/Cancel Buttons (BAYSENS074*)
L = Programmable Zone Sensor w/ System Function Lights for CV/SZVAV/VAV (BAYSENS119*)

Note: **Asterisk indicates current model number digit. These sensors can be ordered to ship with the unit.*

Digit 19 — Ambient Control

0 = Standard
1 = 0° Fahrenheit

Digit 20 — Agency Approval

0 = None (cULus Gas Heater, see note)
1 = cULus

Note: *Includes cULus classified gas heating section only when second digit is a "F."*

Digit 21 — Miscellaneous Options

0 = Unit Mounted Terminal Block
A = Unit Disconnect Switch
B = Unit Disconnect Switch w/ high fault SCCR

Model Number Description

Digit 22 — Refrigeration Options

B = Hot Gas Bypass
C = Hot Gas Reheat w/out Hot Gas Bypass
D = Hot Gas Reheat and Hot Gas Bypass

Digit 23 — Economizer Control Options

O = Without Economizer
C = Economizer Control w/ Comparative Enthalpy
W = Economizer Control w/ Dry Bulb
Z = Economizer Control w/ Reference Enthalpy

Digit 24 — Damper Options

E = Low Leak Economizer Dampers
U = Ultra Low Leak Economizer Dampers and Ultra Low Leak motorized exhaust dampers when exhaust/return option includes motorized dampers

Digit 25 — Miscellaneous Options

F = High Duct Temp Thermostat

Digit 26 — Capacity/Efficiency Options

D = Digital Scroll (20-30 Ton)
G = High Capacity Unit
H = High Efficiency Unit
V = eFlex™ Variable Speed Compressor (40-75 Ton)

Digit 27 — Condenser Options

A = Evap Condenser
B = Evap Condenser w/ Sump Heater
C = Evap Condenser w/ Dolphin WaterCare System
D = Evap Condenser w/ Sump Heater and Dolphin WaterCare System
E = Evap Condenser w/ Conductivity Controller
F = Evap Condenser w/ Conductivity Controller and Sump Heater
O = Air Cooled Aluminum Condenser Coil
J = Corrosion Protected Condenser Coil

Digit 28 — Control Options

B = GBAS 0-10V
K = GBAS 0-5V
R = Rapid Restart

Digit 29 — Miscellaneous Options

A = Motors w/ Internal Shaft Grounding

Digit 30 — Miscellaneous Options

M = Remote Human Interface

Digit 31 — Miscellaneous Options

N = Ventilation Override Module

Digit 32 — Service Options

0 = None
R = Extended Grease Lines
1 = Differential Pressure Gauge
2 = Extended Grease Lines and Differential Pressure Gauge
3 = Stainless Steel Sloped Drain Pan
4 = Stainless Steel Sloped Drain Pan with Grease Lines
5 = Stainless Steel Sloped Drain Pan with Filter Gauge
6 = Stainless Steel Sloped Drain Pan with Grease Lines and Filter Gauge

Digit 33 — Cabinet Options

0 = Standard Panels
1 = Standard Panels w/ Double Wall
T = Hinged Access Doors
2 = Hinged Access Doors w/ Double Wall
U = IRU - w/ Std Panels
3 = IRU - w/ Std Panels w/ Double Wall
W = IRU - w/ Hinged Access Doors
4 = IRU - w/ Hinged Access Doors w/ Double Wall
Y = IRU w/SST - w/ Std Panels
5 = IRU w/SST - w/ Std Panels w/ Double Wall
Z = IRU w/SST - w/ Hinged Access Doors
6 = IRU w/SST - w/ Hinged Access Doors w/ Double Wall

Digit 34 — Miscellaneous Options

V = Inter-Processor Communication Bridge

Digit 35 — BAS/Communication Options

M = BACnet® Communication Interface (BCI) Module
Y = Trane® Communication Interface (TCI) Module
7 = Trane® LonTalk® Communication Interface (LCI) Module

Digit 36 — Miscellaneous Options

8 = Spring Isolators

Digit 37 — Miscellaneous Options

6 = Factory-Powered 15A GFI Convenience Outlet/Disconnect Switch

Digit 38 — Miscellaneous Options

A = Supply Fan Piezometer

Notes: Example

Model numbers:
SAH-
*L*5040A68A6BD800100W00G0-*
B000R000800 describes a unit with the following characteristics:

- *DX Cooling Only unit w/ no extended casing*
- *50 ton nominal cooling capacity*
- *460/60/3 power supply*
- *100% exhaust with Statitrac*
- *10 HP exhaust fan motor with drive selection No. 8 (800 RPM)*
- *throwaway filters*
- *20 HP supply fan motor with drive selection No. B (1100 RPM)*
- *0-100% economizer w/ dry bulb control*
- *supply and exhaust VFD w/o bypass*
- *no remote panel*
- *standard ambient control*
- *cULus agency approval*
- *extended grease lines*
- *spring isolators*

The service digit for each model number contains 38 digits. All 38 digits must be referenced.

S*HK – 90 - 130 Ton, Air Cooled

Digit 1 — Unit Type

S = Self-Contained (Packaged Rooftop)

Digit 2 — Unit Function

E = DX Cooling, Electric Heat
F = DX Cooling, Natural Gas Heat
L = DX Cooling, Hot Water Heat
S = DX Cooling, Steam Heat
X = DX Cooling, No Heat, Extended Casing

Digit 3 — System Type

H = Single Zone

Digit 4 — Development Sequence

K = R-410A Development Sequence

Digit 5, 6, 7 — Nominal Capacity

***90** = 90 Ton Air Cooled
***11** = 105 Ton Air Cooled
***12** = 115 Ton Air Cooled
***13** = 130 Ton Air Cooled

Digit 8 — Power Supply

4 = 460/60/3 XL
5 = 575/60/3 XL

Digit 9 — Heating Capacity

H = High heat – 2-stage
O = No Heat
P = High heat — 4 to 1 modulation
T = High heat—ultra modulation

Note: *When the second digit calls for "E" (electric heat), the following values apply in Digit 9:*

W = 190kW

Note: *When the second digit calls for "L" (hot water) or "S" (steam) heat, one of the following valve size values must be in Digit 9:*

High Heat Coil: 3 = 1", 4 = 1.25", 5 = 1.5", 6 = 2", 7 = 2.5"

Low Heat Coil: C = 1", D = 1.25", E = 1.5", F = 2", G = 2.5".

Digit 10 — Design Sequence

A = First (Factory Assigned)

Note: *Sequence may be any letter A thru Z, or any digit 1 thru 9.*

Digit 11 — Exhaust Option

0 = None
7 = 100% Exhaust 15 HP w/Statitrac
8 = 100% Exhaust 20 HP w/Statitrac
9 = 100% Exhaust 25 HP w/Statitrac
F = 50% Exhaust 15 HP
H = 100% Exhaust 30 HP w/ Statitrac
J = 100% Exhaust 40 HP w/ Statitrac
K = 100% Exhaust 15 HP w/o Statitrac (CV Only)
L = 100% Exhaust 20 HP w/o Statitrac (CV Only)
M = 100% Exhaust 25 HP w/o Statitrac (CV Only)
N = 100% Exhaust 30 HP w/o Statitrac (CV Only)
P = 100% Exhaust 40 HP w/o Statitrac (CV Only)

Digit 12 — Exhaust Air Fan Drive

(Exhaust Fan)
0 = None
5 = 500 RPM
6 = 600 RPM
7 = 700 RPM
8 = 800 RPM

Digit 13 — Filter (Pre DX/Final)

A = Throwaway
C = High Efficiency Throwaway
D = Bag with Prefilter
E = Cartridge with Prefilter
F = Throwaway Filter Rack (filter not included)
G = Bag Filter Rack (Filter Not Included)
H = StandardThrowaway Filter/Cartridge Final Filters
J = High Efficiency Throwaway Filter/ Cartridge Final Filters
K = Bag Filters with 2"Throwaway Prefilters/ Cartridge Final Filters
L = Cartridge Filters with 2"Throwaway Prefilters /Cartridge Final Filters
M = StandardThrowaway Filter/Cartridge Final Filters with 2–inch Throwaway Prefilters
N = High EfficiencyThrowaway Filters/ Cartridge Final Filters with 2–inch Throwaway Prefilters
P = Bag Filters with Prefilters Cartridge Final Filters with 2–inch Throwaway Prefilters
Q = Cartridge Filters with Prefilters/Cartridge Final Filters with 2–inch Throwaway Prefilters

Digit 14 — Supply Air Fan HP

C = 30 HP (2-15 HP)
D = 40 HP (2-20 HP)
E = 50 HP (2-25 HP)
F = 60 HP (2-30 HP)
G = 80 HP (2-40 HP)

Digit 15 — Supply Air Fan Drive

A = 1000 RPM
B = 1100 RPM
C = 1200 RPM
D = 1300 RPM
E = 1400 RPM
F = 1500 RPM
G = 1600 RPM

Digit 16 — Outside Air

D = 0-100% Economizer (Std.)
E = 0-100% Economizer w/Traq w/ DCV
F = 0-100% Economizer w/DCV

Note: *Must install CO2 sensor(s) for DCV to function properly.*

Digit 17 — System Control

1 = CV - Zone Temperature Control
2 = CV - Discharge Temperature Control
4 = CV - Zone Temperature Control Space Pressure Control w/Exhaust VFD w/o Bypass
5 = CV - Zone Temperature Control Space Pressure Control w/Exhaust VFD and Bypass
6 = VAV Discharge Temperature Control w/ VFD w/o Bypass
7 = VAV Discharge Temperature Control w/ VFD and Bypass
8 = VAV Discharge Temperature Control Supply and Exhaust Fan w/VFD w/o Bypass
9 = VAV Discharge Temperature Control Supply and Exhaust Fan w/VFD and Bypass
A = VAV – Single Zone VAV – w/VFD w/o Bypass
B = VAV – Single Zone VAV – w/VFD w/ Bypass
C = VAV – Single Zone VAV – Supply and Exhaust/Return Fan w/VFD w/o Bypass
D = VAV – Single Zone VAV – Supply and Exhaust/Return Fan w/VFD w/ Bypass

Digit 18 — Zone Sensor

0 = None
A = Dual Setpoint Manual or Auto Changeover (BAYSENS108*)
B = Dual Setpoint Manual or Auto Changeover w/ System Function Lights (BAYSENS110*)
C = Room Sensor w/ Override and Cancel Buttons (BAYSENS073*)
D = Room Sensor w/ Temperature Adjustment and Override and Cancel Buttons (BAYSENS074*)
L = Programmable Zone Sensor w/ System Function Lights for both CV and VAV (BAYSENS119*)

Note: **Asterisk indicates current model number digit A, B, C, etc. These sensors can be ordered to ship with the unit.*

Model Number Description

Digit 19 — Ambient Control

0 = Standard

Digit 20 — Agency Approval

0 = None (cULus Gas Heater, see note)
1 = cULus

Note: *Includes cULus classified gas heating section only when second digit of Model No. is a "F."*

Digit 21 — Miscellaneous

0 = Unit Mounted Terminal Block
A = Unit Disconnect Switch
B = Unit Disconnect Switch w/ high fault SCCR

Digit 22 — Refrigeration Options

B = Hot Gas Bypass

Digit 23 — Economizer Control Options

C = Economizer Control w/ Comparative Enthalpy
Z = Economizer Control w/ Reference Enthalpy
W = Economizer Control w/Dry Bulb

Digit 24 — Damper Options

E = Low Leak Economizer Dampers
U = Ultra Low Leak Economizer Dampers and Ultra Low Leak motorized exhaust dampers when exhaust/return option includes motorized dampers

Digit 25 — Miscellaneous

F = High Duct Temperature Thermostat

Digit 26 — Capacity/Efficiency Options

G = High Capacity Evap. Coil (105 Ton)
H = High Cap. Evap. Coil and High Eff. Cond. Coil (90 Ton)

Digit 27 — Condenser Coil Options

0 = Air Cooled Aluminum Condenser Coil
J = Corrosion-Protected Condenser Coil

Digit 28 — Control Options

K = Generic B.A.S Module
R = Rapid Restart

Digit 29 — Miscellaneous

A = Motors w/ Internal Shaft Grounding

Digit 30 — Miscellaneous

M = Remote Human Interface

Digit 31 — Miscellaneous

N = Ventilation Override Module

Digit 32 — Service Options

0 = None
R = Extended Grease Lines
1 = Differential Pressure Gauge
2 = Extended Grease Lines and Differential Pressure Gauge
3 = Stainless Steel Sloped Drain Pan
4 = Stainless Steel Sloped Drain Pan with Grease Lines
5 = Stainless Steel Sloped Drain Pan with Filter Gauge
6 = Stainless Steel Sloped Drain Pan with Grease Lines and Filter Gauge

Digit 33 — Cabinet Options

0 = Standard Panels
1 = Standard Panels w/ Double Wall
T = Hinged Access Doors
2 = Hinged Access Doors w/ Double Wall
U = IRU - w/ Std Panels
3 = IRU - w/ Std Panels w/ Double Wall
W = IRU - w/ Hinged Access Doors
4 = IRU - w/ Hinged Access Doors w/ Double Wall
Y = IRU w/SST - w/ Std Panels
5 = IRU w/SST - w/ Std Panels w/ Double Wall
Z = IRU w/SST - w/ Hinged Access Doors
6 = IRU w/SST - w/ Hinged Access Doors w/ Double Wall

Digit 34 — Miscellaneous

V = Inter-Processor Communication Bridge

Digit 35 — BAS/Communication Options

Y = Trane Communication Interface (TCI) Module
M = BACnet Communication Interface (BCI) Module
7 = Trane LonTalk Communication Interface (LCI) Module

Digit 36 — Miscellaneous

8 = Spring Isolators

Digit 37 — Miscellaneous

6 = Factory-Powered 15A GFI Convenience Outlet

Notes: Example

*Model numbers: SXHK*1140AH8CECD8001**Z describes a unit with the following characteristics:*

- *DX cooling with extended casing*
- *no heat*
- *105 ton nominal cooling capacity*
- *460/60/3 power supply*
- *100 percent exhaust with Statitrac*
- *30 HP exhaust fan motor with drive selection No. 8 - (800 RPM)*
- *high-efficiency throwaway filters*
- *50 hp supply fan motor with 1200 RPM*
- *economizer w/ reference enthalpy control*
- *Supply and Exhaust with VFD but no bypass*
- *cULus agency approval*

The service digit for each model number contains 37 digits; all 37 digits must be referenced.

General Data

Table 9. General data - 20 to 50 tons

	20 Ton	25 Ton	30 ton	40 Ton	50 Ton
Compressor Data - Standard Capacity[a]					
Number/Size (Nominal)	2/10	1/10, 1/11.5	2/13.5	2/7.5, 2/9	4/10
Model	Scroll	Scroll	Scroll	Scroll	Scroll
Unit Capacity Steps (%)	100/50	100/46	100/50	100/72/45/23	100/75/50/25
No. of Circuits	1	1	1	2	2
Compressor Data - High Capacity/High Efficiency[a]					
Number/Size (Nominal)	2/10.5	1/10, 1/13.5	1/13.5, 1/15	4/9	2/10, 2/11.5
Model	Scroll	Scroll	Scroll	Scroll	Scroll
Unit Capacity Steps (%)	100/50	100/43	100/47	100/75/50/25	100/73/46/23
No. of Circuits	1	1	1	2	2
Compressor Data - eFlex Variable Speed[a]					
Number/Size (Nominal)	N/A	N/A	N/A	1/4-17 VS, 1/9, 1/7.5	1/6-25 VS, 1/10, 1/11.5
Capacity Control	N/A	N/A	N/A	Modulating	Modulating
Unit Capacity Steps (%)	N/A	N/A	N/A	15-100	15-100
No. of Circuits	N/A	N/A	N/A	2	2
Air-Cooled Condenser Fans					
Number/Size/Type	2/26"/Prop	3/26"/Prop	3/26"/Prop	4/26"/Prop	6/26"/Prop
Hp (each)	1	1	1	1	1
Cycle/Phase	60/3	60/3	60/3	60/3	60/3
Evaporator Fans					
Forward-Curved Fans (FC)					
Number/Size	2/15"	2/15"	2/18"	2/20"	2/20"
Number of Motors	1	1	1	1	1
Hp Range	3-20	3-20	5-20	7.5-30	7.5-30
Cfm Range[b]	4,000-9,000	5,000-11,000	6,000-13,500	8,000-18,000	10,000-22,500
ESP Range - (In. WG)	0.25-4.0	0.25-4.0	0.25-4.0	0.25-4.0	0.25-4.0
eDrive™ Direct Drive Plenum Fans (DDP)					
Number/Size	1/22.2”	1/22.2”	1/24.5”	1/27.0”	1/30.0”
Number of Motors	1	1	1	1	1
Hp Range	3-20	3-20	3-20	3-25	5-30
Cfm Range[b]	4,000-9,000	5,000-11,000	6,000-13,500	8,000-18,000	10,000-22,500
ESP Range - (In. WG)	0.25-4.0	0.25-4.0	0.25-4.0	0.25-4.0	0.25-4.0
Exhaust Fans					
Forward-Curved Fans (FC) 50% Airflow					
Number/Size	1/15"	1/15"	1/15"	1/18"	1/18"
Hp Range	3	3	3-5	5-7.5	5-7.5
Cfm Range[b]	2,000-6,000	2,000-6,000	2,000-7,000	3,000-11,000	3,000-11,000
ESP Range - (In. WG)	0.25-1.4	0.25-1.4	0.25-1.4	0.25-1.4	0.25-1.4
Forward-Curved Fans (FC) 100% Airflow					
Number/Size/Type	2/15"	2/15"	2/15"	2/18"	2/18"
Hp Range	3	3-5	3-7.5	5-10	5-10
Cfm Range[b]	4,000-10,000	4,000-12,000	4,000-14,000	7,500-16,000	9,000-20,000
ESP Range - (In. WG)	0.2-2.0	0.2-2.0	0.2-2.0	0.2-2.0	0.2-2.0
Return Fans					
Belt Drive Plenum Fans (AF)					
Number/Size	1/24.5	1/24.5	1/24.5	1/27.0	1/27.0
Hp Range	3	3.0 - 5.0 HP	3.0 - 7.5	5.0 - 10.0	5.0 - 15.0
Cfm Range	4,000-9,000	4,000-11,000	4,000-12,500	7,500-18,000	9,000-20,000
ESP Range - (In. WG)	0.25 - 2.0	0.25 - 2.0	0.25 - 2.0	0.25 - 2.0	0.25 - 2.0
Evaporator Coil					
Size (Ft)	20.3	20.3	25.5	32.5	38
Rows/Fin Series	4/168	4/168	5/168	5/168	4/168
Tube Diameter/Surface	1/2”/Enhanced	1/2”/Enhanced	3/8”/Enhanced	3/8”/Enhanced	1/2”/Enhanced
Air-Cooled Condenser Coil					
Face Area (Ft^2)	58	58	58	116	116
Fin Series	252	252	252	252	252
Type	Microchannel	Microchannel	Microchannel	Microchannel	Microchannel
Electric Heat					
kW Range[c]	30-110	30-130	30-150	50-170	70-190
Capacity Steps	3	3	3	3	3
Natural Gas Heat - Standard[d]					
Low Heat Input	235	235	350	350	500
High Heat Input	500	500	500	850	850

Table 9. General data - 20 to 50 tons (continued)

	20 Ton	25 Ton	30 ton	40 Ton	50 Ton
Std. Heating Capacity Steps	2	2	2	2	2
Modulating Gas Heat (Not Available on 20 to 40 Ton Models with Low Heat). See Gas heat inputs/input ranges table					
4 to 1[e] and Ultra[f] Modulation Heat Exchanger Type	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
Gas Heat Steady State Efficiency% [g]					
	80%	80%	80%	80%	80%
Hot Water Coil					
Size (Inches)	30x66x2 Row	30x66x2 Row	30x66x2 Row	42x66x2 Row	42x66x2 Row
Type	5W Prima-Flo E w/ turbulators	5W Prima-Flo E w/ turbulators	5W Prima-Flo E w/ turbulators	5W Prima-Flo E w/ turbulators	5W Prima-Flo E w/ turbulators
High Heat (Fins/Ft)	110	110	110	110	110
Low Heat (Fins/Ft)	80	80	80	80	80
Steam Coil					
Size (Inches)	30x66x1 Row	30x66x1 Row	30x66x1 Row	30x66x1 Row, 12x66x1 Row	30x66x1 Row 12x66x1 Row
Type	Type NS	Type NS	Type NS	Type NS	Type NS
High Heat (Fins/Ft)	96	96	96	96	72
Low Heat (Fins/Ft)	42	42	42	42	42
Pre-Evap Filters					
Panel Filters (Number/Size - Inches)	12 - 20x20x2	12 - 20x20x2	16 - 20x20x2	16 - 20x25x2	20 - 20x25x2
Face Area (Ft^2)	33.3	33.3	44.4	55.5	69.4
Bag Filters (Number/Size - Inches)	4 - 12x24x19 3 - 24x24x19	4 - 12x24x19 3 - 24x24x19	2 - 12x24x19 6 - 24x24x19	5 - 12x24x19 6 - 24x24x19	3 - 12x24x19 9 - 24x24x19
Cartridge Filters (Number/Size - Inches)	4 - 12x24x12 3 - 24x24x12	4 - 12x24x12 3 - 24x24x12	2 - 12x24x12 6 - 24x24x12	5 - 12x24x12 6 - 24x24x12	3 - 12x24x12 9 - 24x24x12
Prefilters (For Bag & Cartridge) (Number/Size - Inches)	4 - 12x24x2 3 - 24x24x2	4 - 12x24x2 3 - 24x24x2	2 - 12x24x2 6- 24x24x2	5 - 12x24x2 6 - 24x24x2	3 - 12x24x2 9 - 24x24x2
Face Area (Ft^2)	20	20	28	34	42
Final Filters (SX Units only)					
Cartridge Filters (Number/Size - Inches)	4 - 12x24x12 3 - 24x24x12	4 - 12x24x12 3 - 24x24x12	1 - 12x24x12 6 - 24x24x12	5 - 12x24x12 6 - 24x24x12	2 - 12x24x12 9 - 24x24x12
Prefilters (For Cartridge Filters) (Number/Size - Inches)	4 - 12x24x2 3 - 24x24x2	4 - 12x24x2 3 - 24x24x2	1 - 12x24x2 6 - 24x24x2	5 - 12x24x2 6 - 24x24x2	2 - 12x24x2 9 - 24x24x2
Face Area (Ft^2)	20	20	26	34	40
Standard Unit Minimum Outside Air Temperature for Mechanical Cooling[h]					
Without Hot Gas Option	55°F	50°F	50°F	55°F	45°F
With Hot Gas Option	55°F	50°F	50°F	55°F	45°F
Low Ambient Option Minimum Outside Air Temperature					
Without Hot Gas Option	0°F	0°F	0°F	0°F	0°F
With Hot Gas Option	10°F	10°F	10°F	10°F	10°F

[a] 20 to 30 ton models are single circuit, 40 ton models are dual circuit.
[b] For CFM values outside these ranges, contact your local Trane sales office.
[c] Refer to Electric heat kW ranges table for availability of kW ranges by voltage
[d] Two-stage gas heat: 1st stage 50% of heater MBh.
[e] The firing rate of the unit can vary from pilot rate of 125 or 210 MBh up to the nameplate rating of the unit.
[f] The firing rate of the unit can vary from 36 MBh on 500 MBh or 48 MBh on 850 MBh gas heat exchangers, up to the nameplate rating of the unit.
[g] Heating Performance is AHRI and DOE certified
[h] Maximum return temperatures of 95ºF. Any higher, contact Product Support.

Table 10. General data - 55 to 75 tons

	55 ton	60 Ton	70 ton	75 ton
Compressor Data - Standard Capacity[a]				
Number/Size (Nominal)	4/11.5	2/11.5, 2/13.5	4/15	2/14.5, 2/20
Model	Scroll	Scroll	Scroll	Scroll
Unit Capacity Steps (%)	100/75/50/25	100/73/46/23	100/75/50/25	100/71/43/21
No. of Circuits	2	2	2	2
Compressor Data - High Capacity/High Efficiency[a]				
Number/Size (Nominal)	4/11.5	4/13.5	4/15	2/15.5, 2/21
Model	Scroll	Scroll	Scroll	Scroll
Unit Capacity Steps (%)	100/75/50/25	100/73/46/23	100/75/50/25	100/71/43/21
No. of Circuits	2	2	2	2
Compressor Data - eFlex Variable Speed[a]				
Number/Size (Nominal)	1/6-25 VS, 1/11.5, 1/13.5	1/6-25 VS, 1/13.5, 1/15	1/6-25 VS, 1/15, 1/20	1/6-25 VS, 2/15, 1/20
Capacity Control	Modulating	Modulating	Modulating	Modulating
Unit Capacity Steps (%)	15-100	15-100	15-100	15-100
No. of Circuits	2	2	2	2
Air-Cooled Condenser Fans				
Number/Size/Type	6/26"/Prop	6/26"/Prop	6/26"/Prop	6/26"/Prop
Hp (each)	1	1	1	1
Cycle/Phase	60/3	60/3	60/3	60/3
Evaporator Fans				
Forward-Curved Fans (FC)				
Number/Size	2/20"	2/22"	2/22"	2/22"
Number of Motors	1	1	1	1
Hp Range	7.5-30	10-50[c]	10-50[c]	10-50[c]
Cfm Range[b]	10,000-22,500	14,000-27,000	16,000-27,000	16,000-27,000
ESP Range - (In. WG)	0.25-4.0	0.25-4.0	0.25-4.0	0.25-4.0
eDrive™ Direct Drive Plenum Fans (DDP)				
Number/Size	1/30.0"	2/24.5"	2/27.0"	2/27.0"
Number of Motors	1	2	2	2
Hp Range	5-30	10-40 [c]	10-50	10-50
Cfm Range[b]	10,000-22,500	14,000-27,000	16,000-27,000	16,000-27,000
ESP Range - (In. WG)	0.25-4.0	0.25-4.0	0.25-4.0	0.25-4.0
Exhaust Fans				
Forward-Curved Fans (FC) 50% Airflow				
Number/Size	1/18"	1/20"	1/20"	1/20"
Hp Range	5-7.5	5-7.5	5-7.5	5-7.5
Cfm Range[b]	3,000-11,000	4,000-13,000	4,000-13,000	4,000-13,000
ESP Range - (In. WG)	0.25-1.4	0.25-1.4	0.25-1.4	0.25-1.4
Forward-Curved Fans (FC) 100% Airflow				
Number/Size/Type	2/18"	2/20"	2/20"	2/20"
Hp Range	5-15	5-20	5-20	5-20
Cfm Range[b]	9,000-20,000	12,000-27,000	12,000-27,000	12,000-27,000
ESP Range - (In. WG)	0.20-2.0	0.20-2.0	0.20-2.0	0.20-2.0
Return Fans				
Belt Drive Plenum Fans (AF)				
Number/Size	1/27.0	1/36.5	1/36.5	1/36.5
Hp Range	5.0 - 15.0	5.0 - 20.0	5.0 - 20.0	5.0 - 20.0
Cfm Range	9,000-20,000	12,000-27,000	12,000-27,000	12,000-27,000
ESP Range - (In. WG)	0.25 - 2.0	0.25 - 2.0	0.25 - 2.0	0.25 - 2.0
Evaporator Coil				
Size (Ft)	38	43	43	43
Rows/Fin Series	4/168	6/168	6/168	6/168
Tube Diameter/Surface	1/2”/Enhanced	3/8”/Enhanced	3/8”/Enhanced	3/8”/Enhanced
Air-Cooled Condenser Coil				
Face Area (Ft^2)	116	136	136	136
Fin Series	252	252	252	252
Type	Microchannel	Microchannel	Microchannel	Microchannel
Electric Heat				
kW Range[d]	70-190	90-190	90-190	90-190
Capacity Steps	3	3	3	3
Natural Gas Heat - Standard[e]				
Low Heat Input	500	500	500	500
High Heat Input	850	850	850	850
Std. Heating Capacity Steps	2	2	2	2
Modulating Gas Heat (Not Available on 20 to 40 Ton Models with Low Heat). See Gas heat inputs/input ranges table				

Table 10. General data - 55 to 75 tons (continued)

	55 ton	60 Ton	70 ton	75 ton
4 to 1[f] and Ultra[g] Modulation Heat Exchanger Type	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
Gas Heat Steady State Efficiency% [h]				
	80%	80%	80%	80%
Hot Water Coil				
Size (Inches)	42x66x2 Row	42x90x2 Row	42x90x2 Row	42x90x2 Row
Type	5W Prima-Flo E w/ turbulators	5W Prima-Flo E w/ turbulators	5W Prima-Flo E w/ turbulators	5W Prima-Flo E w/ turbulators
High Heat (Fins/Ft)	110	110	110	110
Low Heat (Fins/Ft)	80	80	80	80
Steam Coil				
Size (Inches)	30x66x1 Row 12x66x1 Row	30x90x1 Row 12x90x1 Row	30x90x1 Row 12x90x1 Row	30x90x1 Row 12x90x1 Row
Type	Type NS	Type NS	Type NS	Type NS
High Heat (Fins/Ft)	96	72	72	72
Low Heat (Fins/Ft)	42	42	42	42
Pre-Evap Filters				
Panel Filters (Number/Size - Inches)	20 - 20x25x2	35 - 16x20x2	35 - 16x20x2	35 - 16x20x2
Face Area (Ft^2)	69.4	77.8	77.8	77.8
Bag Filters (Number/Size - Inches)	3 - 12x24x19 9 - 24x24x19	6 - 12x24x19 8 - 24x24x19	6 - 12x24x19 8 - 24x24x19	6 - 12x24x19 8 - 24x24x19
Cartridge Filters (Number/Size - Inches)	3 - 12x24x12 9 - 24x24x12	6 - 12x24x12 8 - 24x24x12	6 - 12x24x12 8 - 24x24x12	6 - 12x24x12 8 - 24x24x12
Prefilters (For Bag & Cartridge) (Number/Size - Inches)	3 - 12x24x2 9 - 24x24x2	6 - 12x24x2 8 - 24x24x2	6 - 12x24x2 8 - 24x24x2	6 - 12x24x2 8 - 24x24x2
Face Area (Ft^2)	42	44	44	44
Final Filters (SX Units only)				
Cartridge Filters (Number/Size - Inches)	2 - 12x24x12 9 - 24x24x12	6 - 12x24x12 8 - 24x24x12	6 - 12x24x12 8 - 24x24x12	6 - 12x24x12 8 - 24x24x12
Prefilters (For Cartridge Filters) (Number/Size - Inches)	2 - 12x24x2 9 - 24x24x2	6 - 12x24x2 8 - 24x24x2	6 - 12x24x2 8 - 24x24x2	6 - 12x24x2 8 - 24x24x2
Face Area (Ft^2)	40	44	44	44
Standard Unit Minimum Outside Air Temperature for Mechanical Cooling[i]				
Without Hot Gas Option	35°F	30°F	45°F	45°F
With Hot Gas Option	35°F	30°F	45°F	45°F
Low Ambient Option Minimum Outside Air Temperature				
Without Hot Gas Option	0°F	0°F	0°F	0°F
With Hot Gas Option	10°F	10°F	10°F	10°F

[a] 20 to 30 ton models are single circuit, 40 ton models are dual circuit.
[b] For CFM values outside these ranges, contact your local Trane sales office.
[c] 60 ton units with gas heat require the 27" DDP fans.
[d] Refer to Electric heat kW ranges table for availability of kW ranges by voltage
[e] Two-stage gas heat: 1st stage 50% of heater MBh.
[f] The firing rate of the unit can vary from pilot rate of 125 or 210 MBh up to the nameplate rating of the unit.
[g] The firing rate of the unit can vary from 36 MBh on 500 MBh or 48 MBh on 850 MBh gas heat exchangers, up to the nameplate rating of the unit.
[h] Heating Performance is AHRI and DOE certified
[i] Maximum return temperatures of 95ºF. Any higher, contact Product Support.

Table 11. General data - 90 to 130 tons

	90 ton	105 ton	115 ton	130 ton
Compressor Data - Standard Capacity[a]				
Number/Size (Nominal)	4/20	2/20 2/25	2/20 2/25	4/25
Model	Scroll	Scroll	Scroll	Scroll
Unit Capacity Steps (%)	100/75/50/25	100/72/44/22	100/72/44/22	100/75/50/25
No. of Circuits	2	2	2	2
	Evaporator Fans			
Airfoil				
Number/Size	2/28"	2/28"	2/28"	2/28"
Number of Motors	2	2	2	2
Hp Range	30-80	30-80	30-80	30-80
Cfm Range[b]	26,000-46,000	26,000-46,000	26,000-46,000	26,000-46,000
ESP Range - (In. WG)	1.0-4.70	1.0-4.70	1.0-4.70	1.0-4.70
	Exhaust Fans			
Forward-Curved Fans (FC) 50% Airflow				
Number/Size	1/22"	1/22"	1/22"	1/22"
Hp Range	15	15	15	15
Cfm Range[b]	12,000-20,000	12,000-20,000	12,000-20,000	12,000-20,000

Table 11. General data - 90 to 130 tons (continued)

	90 ton	105 ton	115 ton	130 ton
ESP Range - (In. WG)	.25-2.5	.25-2.5	.25-2.5	.25-2.5
Forward-Curved Fans (FC) 100% Airflow				
Number/Size/Type	2/22"	2/22"	2/22"	2/22"
Hp Range	15-40	15-40	15-40	15-40
Cfm Range[b]	26,000-40,000	26,000-40,000	26,000-40,000	26,000-40,000
ESP Range - (In. WG)	.25-2.5	.25-2.5	.25-2.5	.25-2.5
	Condenser Fans			
Prop. Condenser Fans				
Number/Size	8/26"	10/26"	10/26"	12/26"
Hp (each)	1	1	1	1
Cfm Range	56400	56400	56400	56400
Cycle/Phase	60/3	60/3	60/3	60/3
	Coils			
Evaporator Coil - Standard Capacity				
Dimensions	122.0 x 70.0	N/A	122.0 x 70.0	122.0 x 70.0
Size (Ft)	59.3	N/A	59.3	59.3
Rows/Fin Series	4/148	N/A	6/148	6/148
Tube Diameter/Surface	1/2 Enhanced	N/A	1/2 Enhanced	1/2 Enhanced
Evaporator Coil - High Capacity				
Dimensions	122.0 x 70.0	122.0 x 70.0	N/A	N/A
Size (Ft)	59.3	59.3	N/A	N/A
Rows/Fin Series	6/148	5/148	N/A	N/A
Tube Diameter/Surface	1/2 Enhanced	1/2 Enhanced	N/A	N/A
Condenser Coil - Standard Efficiency				
Size (Ft^2)	N/A	152	152	152
Rows/Fin Series	N/A	2/276	2/276	2/276
Type	N/A	Microchannel	Microchannel	Microchannel
Condenser Coil - High Efficiency				
Size (Ft^2)	152	N/A	N/A	N/A
Rows/Fin Series	2/276	N/A	N/A	N/A
Type	Microchannel	N/A	N/A	N/A
Electric Heat				
kW Range[c]	190	190	190	190
Capacity Steps	3	3	3	3
Natural Gas Heat - Standard[d]				
MBh Heat Input	1000	1000	1000	1000
Std. Heating Capacity Steps	2	2	2	2
High Heat - 4 to 1[e] and Ultra[f] Modulation	See Gas heat inputs/input ranges table			
Heat Exchanger Type	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
Gas Heat Steady State Efficiency%[g]				
	80%	80%	80%	80%
Hot Water Coil				
Size (Inches)	(2) 30x84x2 Row	(2) 30x84x2 Row	(2) 30x84x2 Row	(2) 30x84x2 Row
Type	5W Prima-Flo E w/ turbulators	5W Prima-Flo E w/ turbulators	5W Prima-Flo E w/ turbulators	5W Prima-Flo E w/ turbulators
High Heat (Fins/Ft)	110	110	110	110
Low Heat (Fins/Ft)	80	80	80	80
Steam Coil				
Size (Inches)	(2) 30x84x1 Row	(2) 30x84x1 Row	(2) 30x84x1 Row	(2) 30x84x1 Row
Type	Type NS	Type NS	Type NS	Type NS
High Heat (Fins/Ft)	96	96	96	96
Low Heat (Fins/Ft)	52	52	52	52
	Filters			
Panel Filters (Number/Size - Inches)	25-24x24x2	25-24x24x2	25-24x24x2	25-24x24x2
Face Area (Ft^2)	100	100	100	100
Bag Filters (Number/Size (Inches)	3-12x24x19 15-24x24x19	3-12x24x19 15-24x24x19	3-12x24x19 15-24x24x19	3-12x24x19 15-24x24x19
Cartridge Filters (Number/Size (Inches)	3-12x24x12 15-24x24x12	3-12x24x12 15-24x24x12	3-12x24x12 15-24x24x12	3-12x24x12 15-24x24x12
Prefilters (For Bag & Cartridge)	3-20x24x2 15-24x24x2	3-20x24x2 15-24x24x2	3-20x24x2 15-24x24x2	3-20x24x2 15-24x24x2
Face Area (Ft^2)	65	66	66	66
	Final Filters (SX Units only)			
Cartridge Filters (Number/Size (Inches)	5 - 12x24x12 10 - 24x24x12	5 - 12x24x12 10 - 24x24x12	5 - 12x24x12 10 - 24x24x12	5 - 12x24x12 10 - 24x24x12
Prefilters for Cartridge Filters (Number/Size (Inches)	5 - 12x24x2 10- 24x24x2	5 - 12x24x2 10- 24x24x2	5 - 12x24x2 10- 24x24x2	5 - 12x24x2 10- 24x24x2

Table 11. General data - 90 to 130 tons (continued)

	90 ton	105 ton	115 ton	130 ton
Face Area (Ft^2)	50	50	50	50
Standard Unit Minimum Outside Air Temperature for Mechanical Cooling[h]				
Without Hot Gas Option	45°F	45°F	45°F	45°F
With Hot Gas Option	45°F	45°F	45°F	45°F

[a] 90 to 130 ton models are dual circuit.
[b] For CFM values outside these ranges, contact your local Trane sales office.
[c] Refer to Electric heat kW ranges table for availability of kW ranges by voltage
[d] Two-stage gas heat: 1st stage 50% of heater MBh.
[e] The firing rate of the unit can vary from pilot rate of 250 MBh up to the nameplate rating of the unit.
[f] The firing rate of the unit can vary from 48 MBh on 1000 MBh gas heat exchangers, up to the nameplate rating of the unit.
[g] Heating Performance is AHRI and DOE certified
[h] Maximum return temperatures of 95ºF. Any higher, contact Product Support.

Table 12. EER/IEER ratings

Model	EER	IEER (CV)	IEER (VFD)	AHRI Net Cooling Capacity
S_HL*20****0	10.3	12.8	13.6	242000
S(A,X,F)HL*20****H	11	13.5	14	262000
S_HL*25****0	10.5/10.3	12.5/12.3	13.8	286000
S_HL*25****H	11/10.8	12.8/12.7	14.5	304000
S_HL*30****0	10.2	12.4	13.8	344000
S(A,X)HL*30****H	11	13.2	14.9	360000
S(F)HL*30***(1-9,A)	10.9	13	14.7	360000
S(F)HL*30***(B-Z)	10.8	13	14.7	360000
S_HL*40****0	10.6/10.4	12.4/11.9	14.3/14.2	435000
S_HL*40****G	10.5/10.3	12.2/11.8	14.3/14.2	460000
S_HL*40****H	11/10.7	12.7	14.8/14.7	460000
S(A,X)HL*40****V	10.8	N/A	15.7	435000
S(E,F,L,S)HL*40***(1-9,A)*V	10.7	N/A	15.6	435000
S(F)HL*40***(B-Z)*V	10.6	N/A	15.6	435000
S_HL*50****0	10.9/10.6	12.3/11.7	14.3	545000
S_HL*50****G	10.8/10.5	12.3/11.8	14.2/14.1	580000
S_HL*50****H	11/10.7	12.2/11.8	14.5	580000
S(A,X)HL*50****V	11	N/A	16.4	585000
S(E,F,L,S)HL*50***(1-9,A)*V	10.8	N/A	16.2	585000
S(F)HL*50***(B-Z)*V	10.7	N/A	16.2	585000
S_HL*55****0	10.6/10.3	12.2/11.6	14/13.8	615000
S_HL*55****H	11/10.7	12.1/11.9	14.7	615000
S(A,X)HL*55****V	10.8	N/A	16.5	615000
S(E,F,L,S)HL*55***(1-9,A)*V	10.5	N/A	16.3	615000
S(F)HL*55***(B-Z)*V	10.3	N/A	16.3	615000
S(A,X)HL*60****0	10.8	12.4	14.0	670000
S(E,F,L,S)HL*60****0	10.5	12	14.0	665000
S_HL*60****G	10.7/10.6	12.7/12.3	14.4	700000
S_HL*60****H	11/10.8	12.9	14.5	700000
S_HL*60****V	10.5/10.4	N/A	16.6/16.5	700000

Notes:

1. Cooling Only/Heat.
2. Cooling performance is rated at 95°F ambient, 80°F entering dry bulb, 67°F entering wet bulb. Gross capacity does not include the effect of fan motor heat. AHRI capacity is net and includes the effect of fan motor heat. Units are suitable for operation to ±20% of nominal cfm. Units are certified in accordance with the Unitary Air-Conditioner Equipment certification program, which is based on AHRI Standard 340/360.
3. EER and/or IEER are rated at AHRI conditions and in accordance with DOE test procedures.
4. For simplified verification of your specific unit EER/IEER, and capacity at operating conditions, it is strongly recommended that a TOPSS (Trane Official Product Selection System) report be run.

Table 13. Economizer outdoor air damper leakage (of rated airflow)

	ΔP Across Dampers (In. WC)	
	0.5 (In.)	**1.0 (In.)**
Standard	1.5%	2.5%
Optional Low Leak	0.5%	1.0%
Optional Ultra Low Leak	—	3 CFM/Ft^2

Note: Above data for Standard and Low Leak based on tests completed in accordance with AMCA Standard 500 at AMCA Laboratories. Ultra low leak damper leakage rate is AMCA certified and meets California Title 24.

Table 14. Gas heat inputs/input ranges

Standard Gas Heat (MBh)	Two-Stage Gas Heat		Modulating Gas Heat	
	Low Fire Heat Input (MBh)	High Fire Heat Input (MBh)	4 to 1 Modulating Heat Input Range (MBh)	Ultra Modulating Heat Input Range (MBh)
235	117	235	NA	NA
350	175	350	NA	NA
500	250	500	125 - 500	36 - 500
850	425	850	210 - 850	48 - 850
1000	500	1000	250 - 1000	48 - 1000

Performance Adjustment Factors

Table 15. Enthalpy of saturated air

Wet Bulb Temperature	Btu Per Lb.
40	15.23
41	15.70
42	16.17
43	16.66
44	17.15
45	17.65
46	18.16
47	18.68
48	19.21
49	19.75
50	20.30
51	20.86
52	21.44
53	22.02
54	22.62
55	23.22
56	23.84
57	24.48
58	25.12
59	25.78
60	26.46
61	27.15
62	27.85
63	28.57
64	29.31
65	30.06
66	30.83
67	31.62
68	32.42
69	33.25
70	34.09
71	34.95
72	35.83
73	36.74
74	37.66
75	38.61

Figure 14. Air density ratios

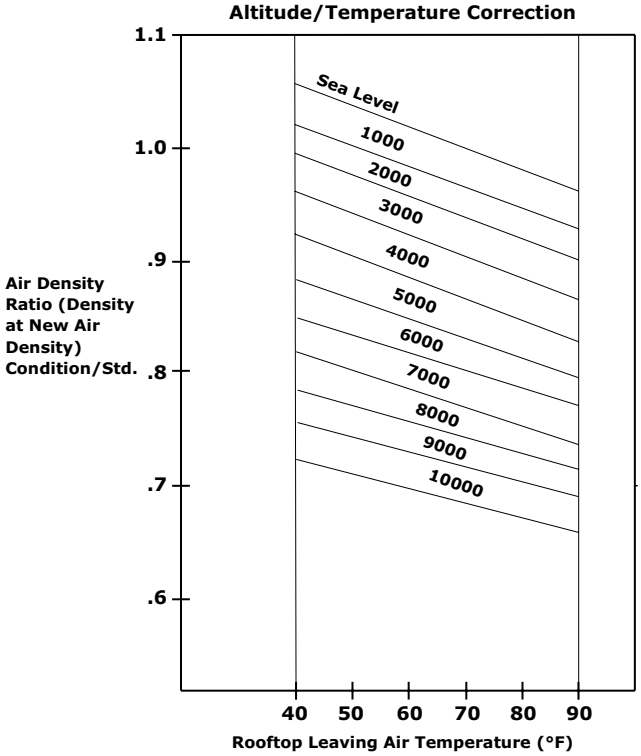


Table 16. Cooling capacity altitude correction factors

	Altitude (ft)								
	Sea Level	**1000**	**2000**	**3000**	**4000**	**5000**	**6000**	**7000**	**8000**
Cooling Capacity Multiplier	1.00	1.00	0.99	0.99	0.99	0.98	0.98	0.97	0.97
kW Correction Multiplier	1.00	1.00	1.00	1.00	1.01	1.01	1.01	1.02	1.02
Sensible Heat Ratio Correction Multiplier	1.00	0.97	0.94	0.92	0.89	0.87	0.84	0.81	0.79

Table 17. Gas heating capacity altitude correction factors

	Sea Level to 2000	**2001 to 2500**	**2501 to 3500**	**3501 to 4500**	**4501 to 5500**	**5501 to 6500**	**6501 to 7500**
Capacity Multiplier	1.00	0.92	0.88	0.84	0.80	0.76	0.72

Performance Data

Gross Cooling Capacities

Table 18. Gross cooling capacities (MBh) — 20 ton air-cooled — standard capacity

CFM	Ent DB (°F)	Ambient Temperature (°F)																	
		85						95						105					
								Entering Wet Bulb (°F)						Entering Wet Bulb (°F)					
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
4000	75	205	145	230	119	255	91	196	140	220	114	244	86	186	134	209	108	230	80
	80	207	167	231	141	256	113	198	162	220	136	244	108	189	156	209	130	231	102
	85	209	189	232	163	256	135	201	184	222	158	244	129	191	178	211	152	231	123
	90	213	212	233	184	256	156	205	205	223	179	245	151	196	196	212	173	232	145
6000	75	230	179	253	139	273	96	219	173	241	134	260	90	207	166	228	127	244	84
	80	233	211	254	171	274	128	223	205	242	165	260	122	211	199	229	159	245	116
	85	240	240	255	202	274	160	230	230	243	196	261	154	219	219	230	189	245	148
	90	252	252	256	233	275	190	242	242	244	227	261	184	230	230	230	220	245	177
7000	75	237	194	260	148	278	97	225	188	247	142	264	92	213	181	233	136	247	86
	80	242	232	261	184	278	134	231	226	248	178	264	129	218	218	234	171	247	122
	85	252	252	261	220	278	171	242	242	249	213	264	165	230	230	234	206	247	158
	90	264	264	262	255	279	206	253	253	249	249	264	199	239	239	235	235	247	192
8000	75	242	208	264	157	281	99	230	202	251	151	266	94	217	195	236	144	250	88
	80	249	249	265	196	281	141	239	239	252	190	266	135	226	226	237	183	249	129
	85	262	262	266	237	282	182	250	250	252	230	266	175	237	237	237	223	249	168
	90	272	272	266	266	283	221	259	259	253	253	267	215	244	244	238	238	250	207
9000	75	247	222	268	165	283	101	234	215	254	159	268	95	221	208	239	153	252	89
	80	257	257	268	208	285	148	246	246	255	202	268	142	233	233	239	195	251	136
	85	268	268	269	253	285	193	256	256	255	247	269	186	242	242	240	240	251	179
	90	278	278	269	269	286	237	264	264	255	255	270	230	249	249	240	240	252	223

CFM	Ent DB (°F)	Ambient Temperature (°F)					
		115					
		Entering Wet Bulb (°F)					
		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC
4000	75	176	129	197	102	216	74
	80	179	150	197	124	217	95
	85	181	172	199	146	217	117
	90	188	188	200	166	218	139
6000	75	194	160	213	121	228	78
	80	199	192	214	152	228	109
	85	208	208	215	182	228	141
	90	217	217	216	213	228	170
7000	75	200	174	217	129	230	79
	80	206	206	218	164	230	116
	85	217	217	219	199	229	150
	90	225	225	219	219	229	184
8000	75	203	188	220	138	232	81
	80	213	213	221	176	231	122
	85	222	222	221	216	231	160
	90	228	228	222	222	231	200
9000	75	206	201	223	143	234	83
	80	218	218	223	187	232	129
	85	226	226	223	223	232	171
	90	232	232	223	223	232	215

Table 19. Gross cooling capacities (MBh) — 20 ton air-cooled — high efficiency

CFM	Ent DB (°F)	Ambient Temperature (°F)																	
		85						95						105					
		Entering Wet Bulb (°F)						Entering Wet Bulb (°F)						Entering Wet Bulb (°F)					
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
4000	75	227	160	255	132	284	102	217	154	244	126	272	97	207	148	232	120	258	90
	80	230	184	256	155	285	126	220	178	244	149	273	120	209	171	232	143	259	114
	85	232	207	257	179	285	149	222	201	246	173	273	143	211	195	234	167	259	137
	90	235	231	258	202	285	172	225	225	247	196	273	166	216	216	235	189	259	160
6000	75	255	196	282	154	310	109	243	190	270	148	295	103	231	183	255	141	278	96
	80	259	231	284	189	311	144	248	225	271	182	296	137	235	218	256	175	279	130
	85	265	265	285	222	311	178	255	255	272	216	296	172	243	243	257	208	279	165
	90	279	279	286	255	312	212	268	268	273	248	297	205	256	256	258	241	280	197
7000	75	264	213	291	164	317	112	251	206	277	158	301	105	238	199	262	151	283	98
	80	269	254	292	203	318	152	257	247	278	197	302	145	244	240	263	189	283	138
	85	280	280	294	242	318	192	269	269	280	235	302	185	256	256	264	227	284	177
	90	295	295	295	280	319	229	283	283	281	273	303	222	269	269	265	265	285	214
8000	75	270	228	298	174	322	114	257	221	283	167	305	108	243	214	267	160	286	101
	80	278	275	299	217	322	159	265	265	284	210	306	153	252	252	268	203	287	145
	85	292	292	300	260	323	203	280	280	285	253	306	196	266	266	269	246	287	188
	90	307	307	301	301	323	245	293	293	286	286	307	238	278	278	270	270	287	230
9000	75	276	243	302	183	325	116	262	236	287	176	308	110	247	228	270	169	289	103
	80	286	286	303	230	326	167	274	274	288	223	309	160	260	260	271	215	289	153
	85	302	302	304	279	326	215	289	289	289	272	309	207	274	274	272	264	289	199
	90	316	316	305	305	326	262	301	301	290	290	309	254	285	285	273	273	289	246

CFM	Ent DB (°F)	Ambient Temperature (°F)					
		115					
		Entering Wet Bulb (°F)					
		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC
4000	75	195	142	219	113	243	84
	80	198	165	220	137	243	107
	85	201	188	222	160	244	130
	90	207	207	222	183	244	153
6000	75	217	176	239	134	259	89
	80	221	210	240	168	260	123
	85	231	231	242	200	260	157
	90	243	243	242	233	261	189
7000	75	223	191	245	143	263	91
	80	230	230	246	181	264	130
	85	242	242	247	219	264	169
	90	254	254	248	248	264	205
8000	75	228	206	249	153	266	93
	80	238	238	250	194	266	138
	85	251	251	251	237	267	180
	90	261	261	252	252	266	221
9000	75	232	220	252	162	269	95
	80	245	245	253	207	268	145
	85	257	257	254	254	268	190
	90	266	266	254	254	267	237

Table 20. Gross cooling capacities (MBh) — 25 ton air-cooled — standard capacity

CFM	Ent DB (°F)	Ambient Temperature (°F)																	
		85						95						105					
		Entering Wet Bulb (°F)						Entering Wet Bulb (°F)						Entering Wet Bulb (°F)					
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
4000	75	250	182	279	147	310	111	240	176	266	141	296	105	228	169	252	134	281	99
	80	253	211	279	176	311	140	243	204	267	170	297	134	231	197	253	163	282	127
	85	257	240	282	205	311	168	246	233	270	198	297	162	234	226	257	191	281	155
	90	264	264	284	232	311	197	255	255	272	226	297	191	245	245	258	219	282	184
6000	75	273	216	302	169	329	117	260	209	288	162	314	111	246	201	272	155	296	104
	80	278	256	303	207	330	157	266	249	290	200	315	150	252	241	274	193	298	143
	85	287	287	305	245	330	196	276	276	291	238	316	189	264	264	276	230	298	182
	90	303	303	306	282	332	233	291	291	293	275	317	226	278	278	277	268	299	218
7000	75	285	242	313	185	338	121	271	235	298	179	322	115	256	227	282	172	303	108
	80	293	293	315	230	339	170	281	281	300	223	323	163	267	267	283	215	304	156
	85	309	309	316	277	340	216	297	297	302	269	323	208	282	282	285	261	305	200
	90	324	324	317	317	340	260	311	311	303	303	323	253	295	295	286	286	304	245
8000	75	291	260	319	197	343	124	277	252	303	190	326	118	261	244	286	179	307	111
	80	304	304	320	246	343	179	291	291	305	239	326	172	277	277	288	231	307	165
	85	320	320	322	299	343	229	307	307	306	291	326	221	291	291	289	283	307	213
	90	334	334	322	322	344	280	319	319	307	307	326	272	302	302	290	290	306	264
9000	75	295	273	322	205	346	126	281	266	307	195	329	120	265	258	289	186	309	113
	80	311	311	324	258	345	186	298	298	308	251	328	180	283	283	291	243	309	173
	85	327	327	325	316	346	240	313	313	309	308	328	232	297	297	292	292	308	223
	90	340	340	325	325	347	296	324	324	310	310	328	288	306	306	292	292	308	279

CFM	Ent DB (°F)	Ambient Temperature (°F)					
		115					
		Entering Wet Bulb (°F)					
		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC
4000	75	215	162	238	127	264	91
	80	218	190	238	156	265	120
	85	222	219	242	184	265	148
	90	233	233	244	211	267	177
6000	75	232	193	256	148	277	97
	80	238	233	257	185	278	136
	85	251	251	259	222	279	173
	90	264	264	260	259	280	209
7000	75	241	218	264	164	283	101
	80	253	253	266	207	284	149
	85	267	267	267	253	284	192
	90	278	278	268	268	283	236
8000	75	245	235	268	171	287	103
	80	261	261	269	222	287	158
	85	274	274	270	270	286	204
	90	283	283	271	271	285	254
9000	75	248	248	270	178	289	106
	80	267	267	272	234	289	167
	85	279	279	272	272	286	214
	90	286	286	273	273	286	270

Table 21. Gross cooling capacities (MBh) — 25 ton air-cooled — high efficiency

CFM	Ent DB (°F)	Ambient Temperature (°F)																	
		85						95						105					
		Entering Wet Bulb (°F)						Entering Wet Bulb (°F)						Entering Wet Bulb (°F)					
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
5000	75	266	191	296	156	331	120	255	184	284	149	317	114	242	177	271	143	301	106
	80	269	220	297	185	332	149	257	213	284	178	318	143	245	206	270	171	302	135
	85	272	249	300	214	332	178	261	242	287	208	320	172	249	235	273	200	302	164
	90	277	277	301	242	332	206	268	268	289	235	318	200	257	257	275	228	302	193
7000	75	291	225	323	178	356	127	278	218	309	171	339	120	264	210	292	164	321	113
	80	296	266	325	218	357	167	283	259	310	211	341	160	269	251	294	203	323	153
	85	304	304	327	256	356	207	292	292	312	248	340	200	280	280	296	240	321	192
	90	320	320	328	294	360	245	309	309	314	287	344	238	295	295	298	278	325	230
8750	75	305	253	337	196	368	132	291	245	321	189	350	125	275	237	303	181	330	117
	80	313	304	339	242	370	181	300	296	323	234	352	174	284	284	306	226	332	167
	85	329	329	341	289	371	229	316	316	325	281	353	222	301	301	308	273	333	213
	90	347	347	342	336	372	275	333	333	327	327	355	267	318	318	309	309	335	258
10000	75	312	271	344	207	374	135	298	263	327	200	355	128	281	254	309	192	334	120
	80	323	323	346	258	376	191	310	310	330	251	357	184	296	296	312	242	337	176
	85	342	342	348	312	377	243	329	329	332	304	359	235	313	313	313	295	338	227
	90	360	360	349	349	378	295	345	345	333	333	360	287	329	329	315	315	339	278
11000	75	317	285	348	217	377	137	302	277	331	210	359	130	285	268	313	202	337	122
	80	332	332	351	271	379	199	319	319	334	263	361	192	303	303	315	254	340	184
	85	351	351	352	329	381	254	337	337	336	321	362	246	320	320	317	312	341	237
	90	369	369	354	354	381	311	353	353	337	337	363	303	335	335	318	318	341	294

CFM	Ent DB (°F)	Ambient Temperature (°F)					
		115					
		Entering Wet Bulb (°F)					
		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC
5000	75	229	170	256	135	283	99
	80	232	198	255	164	285	128
	85	236	227	259	192	284	156
	90	246	246	260	220	285	185
7000	75	248	202	275	156	300	105
	80	254	242	277	194	302	145
	85	266	266	279	232	303	184
	90	281	281	280	269	305	221
8750	75	259	228	284	173	308	109
	80	269	269	287	217	310	158
	85	285	285	289	263	311	204
	90	300	300	290	290	312	249
10000	75	264	245	289	184	312	112
	80	279	279	292	232	314	168
	85	295	295	293	285	315	217
	90	309	309	294	294	316	268
11000	75	267	259	292	188	314	114
	80	286	286	295	245	317	175
	85	302	302	296	296	317	227
	90	315	315	297	297	318	284

Table 22. Gross cooling capacities (MBh) — 30 ton air-cooled — standard capacity

CFM	Ent DB (°F)	Ambient Temperature (°F)																	
		85						95						105					
		Entering Wet Bulb (°F)						Entering Wet Bulb (°F)						Entering Wet Bulb (°F)					
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
6000	75	303	221	339	180	373	135	290	214	324	173	356	129	273	206	306	165	336	121
	80	307	256	339	214	374	170	293	248	323	206	357	163	278	240	305	198	338	155
	85	310	290	342	248	374	204	296	282	326	240	358	196	281	274	309	232	339	188
	90	317	317	343	280	374	237	306	306	328	272	357	230	293	293	311	264	338	222
9000	75	334	268	367	209	396	143	318	260	350	201	376	136	300	250	330	193	355	128
	80	339	321	368	256	396	192	324	313	351	248	377	185	306	304	331	239	356	177
	85	351	351	370	303	397	240	337	337	353	294	378	233	321	321	333	285	357	225
	90	368	368	371	349	398	286	353	353	354	341	379	278	336	336	334	332	357	269
10500	75	344	289	375	221	402	146	327	280	357	214	382	139	308	270	336	205	360	131
	80	348	348	376	274	403	202	334	334	358	266	383	195	317	317	338	256	361	187
	85	367	367	378	328	404	258	352	352	360	319	383	251	334	334	339	310	361	242
	90	383	383	379	379	405	308	367	367	361	361	384	300	349	349	340	340	361	290
12000	75	351	308	381	233	407	149	333	299	362	226	387	142	314	290	341	217	364	134
	80	361	361	382	291	408	212	346	346	364	283	386	205	328	328	343	273	364	197
	85	379	379	383	352	409	275	363	363	365	343	387	267	344	344	344	333	364	253
	90	393	393	384	384	410	330	376	376	365	365	388	321	357	357	344	344	364	311
13500	75	356	327	385	245	411	152	338	318	366	237	390	145	318	308	345	229	367	137
	80	371	371	386	308	412	222	355	355	368	299	390	214	336	336	346	289	366	206
	85	388	388	387	375	413	292	371	371	368	366	391	280	351	351	347	347	366	267
	90	404	404	387	387	415	352	384	384	369	369	391	343	363	363	347	347	366	332

CFM	Ent DB (°F)	Ambient Temperature (°F)					
		115					
		Entering Wet Bulb (°F)					
		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC
6000	75	260	198	289	157	316	113
	80	263	232	288	190	317	147
	85	267	266	291	223	319	180
	90	280	280	293	255	318	213
9000	75	282	241	309	184	332	120
	80	288	288	311	229	333	168
	85	304	304	312	275	334	217
	90	318	318	314	314	334	259
10500	75	289	261	315	196	337	123
	80	300	300	316	246	337	178
	85	316	316	318	300	337	229
	90	329	329	319	319	337	280
12000	75	294	280	319	208	340	126
	80	310	310	321	263	340	188
	85	324	324	321	321	340	243
	90	335	335	322	322	339	301
13500	75	298	298	322	213	343	129
	80	317	317	324	279	344	200
	85	330	330	324	324	341	256
	90	340	340	325	325	341	322

Table 23. Gross cooling capacities (MBh) — 30 ton air-cooled — high efficiency

CFM	Ent DB (°F)	Ambient Temperature (°F)																	
		85						95						105					
		Entering Wet Bulb (°F)						Entering Wet Bulb (°F)						Entering Wet Bulb (°F)					
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
6000	75	320	231	358	190	398	146	306	224	343	182	380	138	292	216	325	174	360	130
	80	324	267	359	224	399	181	310	259	343	216	381	173	294	250	324	208	361	164
	85	327	302	362	259	401	215	313	294	346	251	383	207	298	285	328	242	361	199
	90	332	332	363	292	400	249	321	321	347	284	381	241	308	308	330	275	361	232
9000	75	355	280	392	220	430	155	338	271	373	212	408	147	320	262	352	203	384	138
	80	360	334	394	270	432	206	344	326	375	261	410	198	325	316	354	251	387	189
	85	370	370	396	317	434	256	356	356	377	308	413	248	339	339	356	298	389	239
	90	390	390	398	365	435	303	375	375	379	356	414	294	357	357	358	346	391	285
10500	75	366	302	402	234	439	159	348	293	383	225	416	151	328	282	360	216	391	142
	80	373	366	404	289	441	217	353	353	384	279	419	209	336	336	363	269	395	200
	85	389	389	407	343	443	275	373	373	387	334	421	266	355	355	365	324	397	257
	90	410	410	408	398	445	327	393	393	389	389	423	318	374	374	367	367	399	308
12000	75	374	322	410	246	445	162	355	313	389	238	422	154	335	302	367	229	396	145
	80	383	383	412	307	448	228	367	367	392	297	426	219	349	349	369	287	401	211
	85	405	405	415	369	450	293	388	388	394	359	428	284	369	369	371	349	403	276
	90	426	426	416	416	452	350	408	408	396	396	429	341	388	388	373	373	405	331
13500	75	380	342	416	259	451	166	361	332	395	250	427	157	340	321	371	241	400	148
	80	395	395	419	324	454	238	378	378	398	315	431	230	359	359	374	304	406	221
	85	417	417	421	393	456	309	399	399	400	383	433	301	379	379	376	373	408	292
	90	439	439	423	423	458	372	420	420	401	401	435	363	399	399	378	378	410	353

CFM	Ent DB (°F)	Ambient Temperature (°F)					
		115					
		Entering Wet Bulb (°F)					
		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC
6000	75	275	207	306	165	337	121
	80	277	241	305	199	339	156
	85	282	276	309	233	339	190
	90	294	294	311	265	339	223
9000	75	300	251	330	194	359	129
	80	306	305	332	240	363	180
	85	321	321	334	287	365	230
	90	339	339	336	335	367	274
10500	75	307	272	337	206	365	133
	80	318	318	339	258	370	191
	85	336	336	341	313	372	248
	90	354	354	343	343	374	298
12000	75	313	291	342	219	370	136
	80	329	329	345	276	375	201
	85	348	348	347	338	377	265
	90	367	367	349	349	379	320
13500	75	318	310	346	231	373	140
	80	338	338	350	293	379	212
	85	358	358	352	352	381	275
	90	376	376	353	353	383	342

Table 24. Gross cooling capacities (MBh) — 40 ton air-cooled — standard capacity

CFM	Ent DB (°F)	Ambient Temperature (°F)																	
		85						95						105					
		Entering Wet Bulb (°F)						Entering Wet Bulb (°F)						Entering Wet Bulb (°F)					
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
8000	75	387	283	434	230	484	175	371	273	415	221	462	166	352	263	394	211	438	156
	80	390	331	434	274	484	220	373	321	414	265	463	211	355	311	392	254	439	200
	85	389	374	436	317	485	263	374	363	417	307	465	254	357	350	397	297	439	244
	90	403	403	439	366	488	307	390	390	420	356	466	298	374	374	399	345	442	287
11000	75	419	327	466	259	514	185	400	317	444	249	489	175	379	306	420	239	462	165
	80	423	396	467	316	516	244	400	384	446	306	492	234	384	375	422	294	465	223
	85	434	434	470	371	518	301	417	417	449	361	494	292	399	399	425	349	468	281
	90	458	458	475	443	519	357	441	441	448	429	495	346	422	422	427	414	469	334
14000	75	439	367	486	284	532	192	418	356	462	274	505	183	395	344	436	263	476	172
	80	444	444	488	352	535	265	426	426	465	341	509	255	406	406	439	328	480	244
	85	470	470	491	420	537	335	452	452	468	408	512	325	431	431	442	396	483	314
	90	496	496	496	496	539	401	477	477	476	476	513	389	455	455	455	455	485	377
16000	75	449	391	495	300	540	197	427	380	471	289	513	187	403	367	444	278	482	176
	80	461	461	498	374	544	277	443	443	474	362	517	267	421	421	447	350	487	256
	85	489	489	501	450	546	357	469	469	477	439	520	347	447	447	450	426	489	335
	90	515	515	515	515	548	428	494	494	494	494	521	417	471	471	471	471	491	404
18000	75	457	414	503	314	546	201	434	403	478	304	518	191	410	390	450	292	487	180
	80	476	476	506	395	549	290	456	456	481	383	521	279	434	434	454	370	490	268
	85	504	504	509	479	553	377	483	483	484	467	526	367	460	460	457	450	495	351
	90	531	531	531	531	555	454	509	509	509	509	528	443	484	484	483	483	496	430

CFM	Ent DB (°F)	Ambient Temperature (°F)					
		115					
		Entering Wet Bulb (°F)					
		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC
8000	75	332	252	371	200	412	145
	80	335	300	370	244	413	190
	85	338	338	374	285	415	233
	90	357	357	377	334	416	276
11000	75	356	293	395	227	432	153
	80	360	355	397	282	436	212
	85	379	379	400	336	438	269
	90	401	401	401	401	440	321
14000	75	371	331	409	251	444	160
	80	385	385	412	315	448	232
	85	408	408	415	383	451	302
	90	430	430	430	430	452	363
16000	75	378	354	416	266	449	164
	80	398	398	419	336	454	244
	85	422	422	422	412	456	323
	90	444	444	444	444	458	390
18000	75	384	376	421	280	453	168
	80	410	410	425	356	456	256
	85	434	434	427	427	460	337
	90	455	455	454	454	462	415

Table 25. Gross cooling capacities (MBh) — 40 ton air-cooled — high capacity

CFM	Ent DB (°F)	Ambient Temperature (°F)																	
		85						95						105					
		Entering Wet Bulb (°F)						Entering Wet Bulb (°F)						Entering Wet Bulb (°F)					
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
8000	75	409	295	459	242	510	185	392	286	440	233	487	176	374	275	418	222	462	165
	80	413	344	458	286	510	231	396	334	439	276	488	221	377	323	417	266	463	210
	85	416	389	461	330	511	274	399	379	442	320	489	264	377	365	420	309	464	253
	90	422	422	463	379	513	318	408	408	444	369	491	308	392	392	423	357	466	297
11000	75	445	341	493	271	542	195	425	331	471	261	516	185	403	319	446	249	487	173
	80	449	410	494	330	543	254	429	400	472	319	518	244	407	387	447	306	489	232
	85	455	455	497	385	545	312	439	439	475	373	519	301	420	420	450	361	491	290
	90	480	480	501	456	545	369	462	462	479	445	520	357	442	442	449	430	492	344
14000	75	467	381	514	296	560	202	445	370	490	285	532	192	421	357	463	274	500	180
	80	471	463	516	365	562	275	449	449	492	353	534	264	428	428	465	341	503	252
	85	493	493	519	433	564	345	474	474	495	421	536	334	452	452	468	408	504	322
	90	519	519	519	519	565	412	499	499	498	498	537	400	475	475	475	475	505	386
16000	75	478	406	524	311	568	206	455	394	499	301	539	196	430	381	471	289	507	184
	80	486	486	526	387	570	287	466	466	501	375	542	276	444	444	473	362	509	264
	85	513	513	529	463	572	366	492	492	504	451	543	355	468	468	476	438	510	343
	90	538	538	538	538	573	439	516	516	516	516	544	426	491	491	490	490	511	412
18000	75	486	429	532	326	575	211	463	417	506	315	545	200	437	404	477	303	511	188
	80	501	501	534	408	577	299	480	480	508	395	546	288	457	457	479	382	513	276
	85	528	528	537	492	578	387	506	506	511	480	548	375	481	481	482	466	514	363
	90	554	554	554	554	579	464	530	530	530	530	549	452	502	502	502	502	514	437

CFM	Ent DB (°F)	Ambient Temperature (°F)					
		115					
		Entering Wet Bulb (°F)					
		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC
8000	75	353	264	394	211	434	154
	80	356	311	393	254	435	198
	85	358	351	397	297	437	241
	90	375	375	399	345	438	285
11000	75	379	306	419	238	454	161
	80	384	375	420	293	456	219
	85	399	399	423	348	458	277
	90	420	420	424	412	459	330
14000	75	395	343	433	261	465	167
	80	406	406	435	326	467	238
	85	428	428	438	394	468	308
	90	448	448	448	448	469	370
16000	75	403	367	440	276	470	171
	80	420	420	442	347	472	250
	85	442	442	444	423	473	329
	90	461	461	460	460	473	396
18000	75	409	389	445	290	474	175
	80	431	431	447	367	475	262
	85	452	452	449	444	476	343
	90	469	469	469	469	476	421

Table 26. Gross cooling capacities (MBh) — 40 ton air-cooled — high efficiency

CFM	Ent DB (°F)	Ambient Temperature (°F)																	
		85						95						105					
		Entering Wet Bulb (°F)						Entering Wet Bulb (°F)						Entering Wet Bulb (°F)					
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
8000	75	415	300	466	246	517	188	398	290	446	236	494	178	380	279	424	225	469	168
	80	419	349	465	291	518	234	402	339	445	281	495	224	382	328	423	270	470	213
	85	422	395	468	335	518	278	405	385	448	325	497	268	382	370	426	313	470	257
	90	428	428	470	385	521	323	414	414	451	374	498	313	398	398	429	363	473	301
11000	75	451	347	501	275	550	198	431	336	478	265	524	187	409	323	452	253	494	176
	80	455	416	501	335	551	258	436	406	479	323	525	247	413	393	454	311	496	236
	85	462	462	504	390	553	317	445	445	482	379	527	306	426	426	457	366	498	294
	90	487	487	508	462	553	374	469	469	486	451	528	362	449	449	455	436	499	349
14000	75	474	387	522	301	568	205	452	375	497	290	540	194	427	362	470	278	508	183
	80	478	469	524	370	570	279	455	455	499	359	542	268	434	434	472	346	510	255
	85	501	501	527	439	572	350	481	481	502	427	544	339	459	459	475	414	512	327
	90	527	527	526	526	573	418	506	506	506	506	545	405	482	482	482	482	513	391
16000	75	485	412	532	316	576	209	462	400	506	305	547	199	436	386	478	293	514	187
	80	493	493	534	393	579	291	473	473	509	380	550	280	450	450	480	367	516	268
	85	520	520	537	470	580	372	499	499	511	458	551	360	475	475	483	444	517	348
	90	546	546	546	546	582	445	524	524	524	524	552	432	498	498	498	498	518	418
18000	75	493	436	540	331	583	214	470	423	513	320	553	203	443	410	484	308	519	191
	80	508	508	542	414	585	304	487	487	516	401	554	292	464	464	487	387	520	280
	85	536	536	545	499	587	392	514	514	518	487	556	381	488	488	489	473	522	368
	90	562	562	562	562	588	471	538	538	538	538	557	458	509	509	509	509	522	443

CFM	Ent DB (°F)	Ambient Temperature (°F)					
		115					
		Entering Wet Bulb (°F)					
		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC
8000	75	359	267	400	214	440	156
	80	362	316	399	258	442	201
	85	364	356	403	301	443	245
	90	380	380	405	350	445	289
11000	75	385	310	425	241	461	163
	80	390	380	426	298	463	223
	85	405	405	429	353	465	281
	90	426	426	430	419	466	335
14000	75	401	349	440	265	472	170
	80	412	412	442	331	474	242
	85	434	434	444	400	475	313
	90	455	455	455	455	476	376
16000	75	409	372	446	280	477	174
	80	426	426	449	352	479	254
	85	448	448	451	429	480	334
	90	467	467	467	467	480	402
18000	75	415	395	452	294	481	178
	80	437	437	454	372	482	266
	85	459	459	456	451	483	348
	90	476	476	476	476	483	427

Table 27. Gross cooling capacities (MBh) — 40 ton air-cooled — eFlex™ variable speed compressor

CFM	Ent DB (°F)	Ambient Temperature (°F)																	
		85						95						105					
		Entering Wet Bulb (°F)						Entering Wet Bulb (°F)						Entering Wet Bulb (°F)					
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
8000	75	390	286	436	232	486	176	374	276	418	223	465	167	356	266	398	213	442	157
	80	393	334	436	276	486	221	377	325	417	267	466	212	359	314	397	257	443	202
	85	397	380	439	320	487	265	381	370	421	310	467	256	362	355	401	300	443	246
	90	407	407	441	369	490	309	393	393	423	360	469	300	378	378	404	349	446	290
11000	75	421	330	468	261	516	185	403	320	447	251	492	176	383	309	424	241	466	166
	80	426	400	469	319	518	245	403	387	448	308	494	236	385	374	426	297	469	225
	85	437	437	472	374	520	303	421	421	452	364	497	294	404	404	429	353	471	284
	90	461	461	477	446	521	359	444	444	457	436	498	349	426	426	432	423	473	338
14000	75	441	370	487	286	533	193	421	359	465	276	508	184	399	348	440	266	480	173
	80	446	446	490	354	536	266	429	429	467	343	511	256	410	410	443	332	484	246
	85	473	473	493	423	539	338	455	455	470	412	514	328	435	435	446	400	487	317
	90	498	498	498	498	540	403	479	479	479	479	516	393	459	459	458	458	489	381
16000	75	451	394	497	301	542	198	430	383	473	291	515	188	407	371	448	281	487	178
	80	464	464	499	376	545	279	446	446	476	365	520	269	425	425	451	353	491	259
	85	491	491	502	453	548	359	472	472	479	442	522	349	451	451	454	431	494	339
	90	517	517	517	517	549	431	497	497	497	497	524	420	475	475	474	474	496	408
18000	75	458	418	504	316	548	202	437	407	480	306	521	192	414	394	454	295	492	182
	80	479	479	507	397	550	291	459	459	483	386	524	281	438	438	458	374	494	271
	85	506	506	510	483	555	380	486	486	486	472	528	370	463	463	460	454	499	354
	90	533	533	533	533	556	458	511	511	511	511	530	447	487	487	487	487	501	434

CFM	Ent DB (°F)	Ambient Temperature (°F)					
		115					
		Entering Wet Bulb (°F)					
		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC
8000	75	338	256	377	203	417	147
	80	341	304	375	247	419	192
	85	343	343	380	289	421	236
	90	362	362	383	338	421	279
11000	75	361	298	400	231	439	156
	80	365	360	402	286	442	215
	85	385	385	405	341	444	273
	90	406	406	406	406	445	326
14000	75	376	335	415	255	451	163
	80	390	390	418	320	455	235
	85	413	413	420	388	457	306
	90	436	436	435	435	459	368
16000	75	383	359	421	270	456	167
	80	404	404	425	341	461	248
	85	428	428	427	417	463	327
	90	449	449	449	449	464	395
18000	75	389	381	427	284	460	171
	80	415	415	430	361	463	260
	85	439	439	433	433	468	342
	90	460	460	460	460	469	421

Table 28. Gross cooling capacities (MBh) — 50 ton air-cooled —standard capacity

CFM	Ent DB (°F)	Ambient Temperature (°F)																	
		85						95						105					
		Entering Wet Bulb (°F)						Entering Wet Bulb (°F)						Entering Wet Bulb (°F)					
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
10000	75	487	360	542	290	602	218	465	348	517	279	576	207	441	335	492	266	546	194
	80	492	419	541	347	604	276	470	407	517	336	578	265	445	393	490	323	548	252
	85	498	478	546	405	603	332	475	465	522	392	577	321	453	449	496	379	548	309
	90	517	517	551	463	607	390	498	498	528	451	582	378	478	478	502	438	552	365
14000	75	527	426	583	332	641	231	502	412	554	319	612	219	475	398	524	306	578	206
	80	537	509	585	409	644	310	513	496	559	396	615	298	486	479	529	382	581	285
	85	559	559	588	484	644	388	538	538	562	471	614	376	514	514	532	457	582	363
	90	590	590	600	568	648	463	568	568	575	556	619	451	543	543	545	536	585	436
17500	75	548	478	605	364	676	247	522	464	576	352	629	228	493	450	544	339	593	215
	80	568	568	608	456	664	337	545	545	580	443	632	325	520	520	548	428	596	312
	85	602	602	611	549	666	433	578	578	582	536	634	417	551	551	550	521	598	403
	90	634	634	634	634	668	522	609	609	609	609	636	509	580	580	580	580	600	494
20000	75	559	514	616	387	670	245	532	500	586	372	637	233	502	485	553	358	600	220
	80	590	590	619	488	673	356	566	566	590	475	641	344	538	538	557	460	604	330
	85	624	624	622	594	675	462	599	599	593	581	643	445	570	570	559	559	606	430
	90	657	657	657	657	677	562	630	630	630	630	644	549	598	598	598	598	607	534
22500	75	568	548	624	405	677	251	540	535	594	393	644	239	509	509	560	374	605	226
	80	608	608	628	520	680	374	583	583	598	506	647	362	554	554	564	491	606	348
	85	643	643	630	630	682	486	616	616	600	600	649	473	585	585	566	566	611	457
	90	674	674	674	674	683	602	645	645	645	645	650	589	611	611	611	611	612	573

CFM	Ent DB (°F)	Ambient Temperature (°F)					
		115					
		Entering Wet Bulb (°F)					
		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC
10000	75	416	321	464	253	513	181
	80	420	379	463	310	516	239
	85	431	431	468	365	516	295
	90	456	456	474	424	519	351
14000	75	446	384	494	293	540	192
	80	460	460	497	367	544	271
	85	488	488	500	442	545	347
	90	515	515	515	515	548	421
17500	75	462	434	509	324	553	201
	80	491	491	513	412	557	297
	85	521	521	515	505	559	387
	90	548	548	547	547	560	477
20000	75	470	468	517	343	559	206
	80	508	508	521	444	563	316
	85	538	538	523	523	565	414
	90	563	563	562	562	566	517
22500	75	477	477	524	358	564	212
	80	522	522	527	474	564	334
	85	550	550	529	529	569	440
	90	573	573	572	572	569	556

Table 29. Gross cooling capacities (MBh) — 50 ton air-cooled —high capacity

CFM	Ent DB (°F)	Ambient Temperature (°F)																	
		85						95						105					
		Entering Wet Bulb (°F)						Entering Wet Bulb (°F)						Entering Wet Bulb (°F)					
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
10000	75	519	378	580	308	645	235	496	365	555	295	617	223	473	352	528	282	585	209
	80	525	437	580	365	646	293	502	424	554	353	618	281	476	410	526	339	586	267
	85	531	496	584	423	646	350	508	483	559	411	619	338	484	469	531	396	587	324
	90	545	545	589	482	650	408	526	526	564	469	622	395	504	504	535	454	590	381
14000	75	566	446	626	350	689	248	540	432	597	337	656	235	511	417	564	323	619	221
	80	576	529	630	429	691	328	547	512	601	415	658	315	518	499	568	400	622	300
	85	593	593	633	505	691	406	571	571	604	491	659	393	545	545	571	475	622	379
	90	625	625	643	588	694	483	602	602	615	574	662	468	575	575	583	559	625	453
17500	75	591	499	652	384	710	257	563	485	621	370	675	244	532	469	586	355	636	229
	80	606	599	655	477	712	354	581	581	624	462	678	341	553	553	589	446	638	326
	85	640	640	658	570	714	451	614	614	626	556	679	437	585	585	592	539	640	422
	90	673	673	674	668	716	541	646	646	646	646	678	531	615	615	615	615	641	510
20000	75	604	535	664	406	720	262	575	521	632	392	684	249	543	504	596	377	644	235
	80	629	629	667	509	723	373	603	603	635	494	687	359	574	574	599	478	646	345
	85	665	665	670	615	724	480	637	637	638	600	688	466	606	606	601	584	648	447
	90	698	698	698	698	726	581	668	668	668	668	689	567	635	635	634	634	648	550
22500	75	614	571	674	427	728	268	584	556	640	411	691	254	551	539	603	396	650	240
	80	649	649	677	541	730	391	622	622	644	526	694	377	590	590	607	509	652	362
	85	685	685	679	659	732	509	655	655	646	642	695	490	622	622	609	609	653	473
	90	717	717	716	716	733	621	685	685	685	685	695	606	648	648	648	648	653	589

CFM	Ent DB (°F)	Ambient Temperature (°F)					
		115					
		Entering Wet Bulb (°F)					
		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC
10000	75	446	338	497	268	549	195
	80	451	395	496	325	551	252
	85	455	449	501	381	552	309
	90	482	482	507	439	554	366
14000	75	481	401	531	308	579	206
	80	492	484	534	383	581	285
	85	518	518	536	459	581	363
	90	546	546	547	538	585	435
17500	75	499	452	548	340	592	214
	80	523	523	551	429	595	310
	85	553	553	554	522	596	404
	90	580	580	580	580	597	492
20000	75	508	487	557	359	599	219
	80	542	542	560	460	601	328
	85	571	571	562	562	602	428
	90	596	596	595	595	603	531
22500	75	515	515	563	379	604	224
	80	556	556	566	491	605	347
	85	584	584	568	568	606	455
	90	606	606	606	606	606	570

Table 30. Gross cooling capacities (MBh) — 50 ton air-cooled —high efficiency

CFM	Ent DB (°F)	Ambient Temperature (°F)																	
		85						95						105					
		Entering Wet Bulb (°F)						Entering Wet Bulb (°F)						Entering Wet Bulb (°F)					
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
10000	75	519	378	580	308	645	235	496	365	555	295	617	223	471	351	528	282	585	209
	80	525	437	580	365	647	293	502	424	554	353	618	281	478	410	526	339	586	267
	85	531	496	584	423	646	350	508	483	559	411	619	338	484	469	531	397	586	324
	90	545	545	589	482	650	408	526	526	564	469	622	395	504	504	536	454	590	381
14000	75	566	446	626	350	689	248	540	432	597	337	656	235	511	417	564	323	620	221
	80	576	529	630	429	691	328	550	516	601	415	659	315	518	499	569	400	622	300
	85	593	593	633	505	692	406	571	571	604	491	659	393	546	546	572	475	622	379
	90	625	625	643	588	695	483	602	602	615	574	663	469	575	575	583	559	626	453
17500	75	591	499	652	384	711	257	563	485	621	370	676	244	532	469	586	355	636	229
	80	606	599	655	477	713	355	581	581	624	462	678	341	553	553	589	446	639	327
	85	640	640	658	570	715	451	614	614	627	556	680	438	585	585	592	540	641	419
	90	673	673	674	668	717	541	646	646	646	646	682	527	615	615	615	615	642	510
20000	75	604	535	664	406	721	263	575	521	632	392	685	249	543	504	596	377	644	235
	80	629	629	668	509	723	373	604	604	635	495	688	360	574	574	599	478	647	345
	85	665	665	670	615	725	481	638	638	638	600	689	466	606	606	602	584	648	447
	90	698	698	698	698	727	582	669	669	669	669	690	567	635	635	635	635	649	550
22500	75	614	571	674	428	729	268	585	555	641	412	692	255	551	539	604	396	650	240
	80	649	649	677	541	731	391	622	622	644	526	695	378	591	591	607	509	653	363
	85	685	685	680	659	733	510	656	656	647	643	696	491	623	623	609	609	654	474
	90	717	717	717	717	734	621	686	686	686	686	697	606	649	649	649	649	654	589

CFM	Ent DB (°F)	Ambient Temperature (°F)					
		115					
		Entering Wet Bulb (°F)					
		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC
10000	75	446	338	498	268	550	195
	80	450	395	496	325	551	253
	85	459	455	501	381	552	309
	90	482	482	507	439	555	366
14000	75	481	401	531	308	579	206
	80	492	484	534	384	582	285
	85	518	518	537	459	582	363
	90	546	546	547	538	585	436
17500	75	499	452	548	340	593	214
	80	524	524	552	429	596	311
	85	553	553	554	522	597	402
	90	581	581	580	580	598	492
20000	75	508	487	557	359	600	219
	80	542	542	560	460	602	329
	85	571	571	562	562	603	429
	90	597	597	596	596	604	532
22500	75	516	516	564	379	605	225
	80	557	557	567	491	606	347
	85	585	585	569	569	608	455
	90	607	607	607	607	607	570

Table 31. Gross cooling capacities (MBh) — 50 ton air-cooled — eFlex™ variable speed compressor

CFM	Ent DB (°F)	Ambient Temperature (°F)																	
		85						95						105					
		Entering Wet Bulb (°F)						Entering Wet Bulb (°F)						Entering Wet Bulb (°F)					
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
10000	75	518	377	577	306	641	233	497	366	555	295	616	222	475	354	531	284	588	211
	80	524	437	576	364	642	291	502	424	554	353	617	280	481	412	530	341	590	269
	85	529	495	581	422	643	349	509	483	559	410	618	338	484	472	535	398	590	326
	90	543	543	585	480	646	406	526	526	564	469	621	395	507	507	540	456	594	383
14000	75	563	444	624	349	686	247	540	432	598	337	657	235	515	419	570	325	625	223
	80	572	528	625	427	688	327	550	515	600	415	659	315	522	501	572	402	628	303
	85	590	590	628	503	688	405	570	570	603	490	659	393	548	548	575	477	627	381
	90	622	622	639	587	692	481	601	601	614	574	663	469	578	578	587	561	632	456
17500	75	587	497	648	382	708	256	563	484	620	370	677	244	536	471	590	357	643	232
	80	602	598	651	475	711	354	580	580	623	462	680	342	557	557	593	448	647	330
	85	636	636	653	568	713	451	614	614	626	555	682	439	589	589	596	541	649	425
	90	670	670	671	667	715	541	646	646	646	646	685	528	620	620	620	620	651	514
20000	75	600	533	660	404	719	262	574	520	631	392	687	250	547	506	600	378	652	238
	80	626	626	663	507	723	373	603	603	635	494	691	361	577	577	604	480	656	348
	85	661	661	666	614	725	481	637	637	637	600	693	468	610	610	606	586	658	451
	90	696	696	696	696	727	582	671	671	670	670	695	569	642	642	642	642	660	554
22500	75	610	569	670	424	728	268	584	555	640	411	695	256	555	541	608	398	659	243
	80	645	645	673	539	731	391	621	621	644	526	699	379	594	594	612	511	663	366
	85	682	682	675	658	734	510	656	656	646	642	701	493	628	628	614	614	665	478
	90	717	717	717	717	735	622	690	690	690	690	703	609	659	659	659	659	667	594

CFM	Ent DB (°F)	Ambient Temperature (°F)					
		115					
		Entering Wet Bulb (°F)					
		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC
10000	75	452	341	504	271	559	198
	80	459	400	504	328	560	256
	85	463	453	509	385	561	313
	90	488	488	514	443	564	370
14000	75	489	405	540	312	591	210
	80	496	484	543	388	594	289
	85	525	525	545	463	593	367
	90	553	553	556	541	598	441
17500	75	508	456	558	343	607	218
	80	531	531	561	433	610	316
	85	562	562	564	526	612	408
	90	591	591	591	591	614	499
20000	75	517	491	567	363	614	224
	80	550	550	570	465	618	334
	85	581	581	573	570	620	435
	90	610	610	610	610	622	539
22500	75	525	525	574	383	620	230
	80	565	565	578	496	623	353
	85	597	597	580	580	626	462
	90	625	625	625	625	627	578

Table 32. Gross cooling capacities (MBh) — 55 ton air-cooled —standard capacity

CFM	Ent DB (°F)	Ambient Temperature (°F)																	
		85						95						105					
		Entering Wet Bulb (°F)						Entering Wet Bulb (°F)						Entering Wet Bulb (°F)					
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
10000	75	538	388	603	318	671	245	516	376	577	306	641	232	490	361	549	292	607	218
	80	545	448	603	376	672	303	522	435	577	363	642	290	495	420	547	349	609	276
	85	550	507	607	434	671	361	528	493	581	421	643	348	500	477	552	406	610	333
	90	561	561	611	493	675	418	542	542	586	479	645	405	520	520	554	463	612	390
14000	75	591	458	653	362	718	259	564	444	622	348	683	245	533	427	588	332	644	230
	80	600	541	654	440	720	338	573	526	626	426	685	325	539	509	592	410	646	309
	85	613	613	659	517	720	417	590	590	629	502	686	403	564	564	595	485	647	387
	90	646	646	669	600	723	494	622	622	639	585	689	479	594	594	605	568	650	462
17500	75	618	512	681	395	741	267	589	496	648	381	704	253	556	480	611	365	662	238
	80	630	616	683	489	743	365	603	596	650	474	706	351	573	573	614	457	664	335
	85	662	662	686	582	743	462	636	636	653	567	707	447	605	605	616	549	666	431
	90	697	697	699	684	746	553	668	668	669	663	709	537	636	636	636	636	667	519
20000	75	632	548	694	417	752	273	601	532	659	403	713	259	567	515	621	387	670	243
	80	653	653	697	521	754	383	626	626	663	506	716	369	595	595	624	488	672	353
	85	689	689	699	627	755	491	660	660	665	611	717	476	627	627	627	594	674	459
	90	723	723	723	723	757	593	692	692	692	692	718	577	657	657	656	656	675	559
22500	75	643	583	704	439	760	278	611	567	669	424	721	264	576	550	629	406	677	249
	80	674	674	707	553	762	401	645	645	672	537	723	387	612	612	632	519	679	371
	85	710	710	709	671	764	520	679	679	674	655	724	505	644	644	635	633	679	483
	90	743	743	743	743	765	632	710	710	710	710	725	616	672	672	671	671	680	598

CFM	Ent DB (°F)	Ambient Temperature (°F)					
		115					
		Entering Wet Bulb (°F)					
		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC
10000	75	462	346	517	277	570	203
	80	468	404	516	333	572	260
	85	476	463	521	390	572	317
	90	496	496	525	448	576	374
14000	75	501	411	551	316	601	214
	80	512	494	555	393	604	293
	85	535	535	558	468	604	371
	90	563	563	566	550	607	444
17500	75	521	462	571	348	616	221
	80	542	542	574	438	618	318
	85	572	572	576	531	619	413
	90	599	599	599	599	621	500
20000	75	531	497	580	370	623	227
	80	561	561	583	470	625	336
	85	591	591	585	575	626	437
	90	616	616	616	616	626	539
22500	75	538	531	587	388	628	232
	80	576	576	590	500	629	354
	85	605	605	592	592	630	463
	90	627	627	627	627	630	578

Table 33. Gross cooling capacities (MBh) — 55 ton air-cooled —high efficiency

CFM	Ent DB (°F)	Ambient Temperature (°F)																	
		85						95						105					
								Entering Wet Bulb (°F)						Entering Wet Bulb (°F)					
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
10000	75	542	390	608	321	675	247	520	378	581	308	646	234	494	364	553	293	612	220
	80	549	450	607	378	676	306	526	437	581	365	647	292	500	422	551	350	613	278
	85	554	509	611	436	677	363	532	495	586	423	647	350	503	479	556	408	613	335
	90	564	564	615	495	680	420	545	545	590	481	650	407	523	523	561	466	617	392
14000	75	595	460	659	364	725	262	568	446	627	350	690	248	538	430	594	335	651	233
	80	604	543	659	443	727	342	577	529	630	429	693	328	543	511	596	412	654	312
	85	617	617	664	519	727	420	594	594	634	504	693	406	567	567	599	487	654	390
	90	650	650	674	602	731	497	625	625	644	587	697	483	598	598	610	571	659	466
17500	75	623	514	686	397	750	271	593	499	653	383	713	257	560	482	616	367	671	241
	80	638	620	689	492	753	369	607	599	656	476	716	355	577	577	619	459	675	339
	85	667	667	692	585	753	466	640	640	659	569	719	452	610	610	622	552	677	434
	90	702	702	705	688	758	557	674	674	675	667	721	542	642	642	642	642	680	525
20000	75	637	551	700	420	763	277	606	535	665	405	724	263	571	517	627	389	681	247
	80	657	657	703	524	766	388	630	630	669	508	728	374	599	599	630	491	685	358
	85	694	694	706	630	768	497	666	666	672	614	730	479	633	633	633	597	688	465
	90	730	730	730	730	771	599	700	700	700	700	733	583	666	666	666	666	690	565
22500	75	648	586	710	442	772	283	616	570	675	427	733	269	580	552	635	408	688	253
	80	679	679	714	556	776	406	650	650	679	540	737	392	617	617	639	522	693	376
	85	717	717	717	674	779	526	686	686	682	658	740	511	652	652	642	639	696	490
	90	754	754	753	753	781	639	722	722	721	721	742	623	685	685	685	685	698	605

CFM	Ent DB (°F)	Ambient Temperature (°F)					
		115					
		Entering Wet Bulb (°F)					
		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC
10000	75	465	348	519	278	575	205
	80	472	406	519	335	576	262
	85	468	463	524	392	578	319
	90	499	499	528	449	580	376
14000	75	504	412	554	318	609	216
	80	515	495	559	395	612	296
	85	538	538	562	470	612	374
	90	567	567	573	553	616	448
17500	75	524	463	575	350	625	225
	80	545	545	579	441	629	322
	85	576	576	582	533	632	418
	90	606	606	606	606	634	506
20000	75	534	498	585	372	634	231
	80	565	565	589	472	638	341
	85	597	597	591	577	641	447
	90	627	627	627	627	643	546
22500	75	542	533	592	390	640	236
	80	581	581	596	503	645	359
	85	613	613	599	599	648	470
	90	644	644	644	644	650	586

Table 34. Gross cooling capacities (MBh) — 55 ton air-cooled — eFlex™ variable speed compressor

CFM	Ent DB (°F)	Ambient Temperature (°F)																	
		85						95						105					
		Entering Wet Bulb (°F)						Entering Wet Bulb (°F)						Entering Wet Bulb (°F)					
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
10000	75	536	387	599	317	666	244	515	376	576	305	640	232	494	364	550	293	611	220
	80	543	447	599	374	667	302	522	435	576	363	641	290	500	422	551	350	612	278
	85	545	505	604	433	667	359	528	493	581	421	641	347	501	478	556	408	613	335
	90	559	559	607	491	670	416	542	542	585	479	644	404	523	523	560	466	616	392
14000	75	587	456	650	360	714	257	563	443	623	348	683	245	537	430	593	334	650	232
	80	596	539	651	439	716	337	572	526	625	426	686	325	539	513	595	412	652	311
	85	610	610	654	515	716	416	589	589	628	501	686	403	567	567	598	487	652	390
	90	642	642	664	598	719	493	621	621	638	584	689	480	597	597	609	570	656	465
17500	75	613	510	676	393	738	267	588	496	647	380	705	254	559	482	615	367	669	241
	80	629	613	678	487	741	365	605	596	649	473	708	352	576	576	618	459	672	338
	85	658	658	681	580	742	461	635	635	652	566	710	448	609	609	620	551	674	434
	90	693	693	699	682	745	552	668	668	668	668	712	538	641	641	640	640	676	523
20000	75	627	546	689	415	750	272	600	532	658	401	716	260	571	517	625	387	678	246
	80	648	648	692	520	753	383	624	624	662	506	719	371	598	598	629	490	682	357
	85	685	685	694	625	755	491	660	660	664	611	721	478	632	632	631	596	684	463
	90	720	720	720	720	757	593	694	694	693	693	723	579	664	664	663	663	686	564
22500	75	638	581	699	435	759	278	610	567	668	422	724	265	580	552	634	407	686	252
	80	669	669	702	551	762	402	644	644	671	537	728	389	616	616	637	521	689	375
	85	707	707	705	669	764	520	680	680	674	653	730	507	650	650	640	630	691	492
	90	742	742	742	742	766	633	714	714	714	714	731	619	682	682	682	682	692	603

CFM	Ent DB (°F)	Ambient Temperature (°F)					
		115					
		Entering Wet Bulb (°F)					
		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC
10000	75	471	351	524	280	580	207
	80	477	409	524	337	581	264
	85	477	464	529	394	582	321
	90	503	503	531	451	585	378
14000	75	510	415	562	321	614	218
	80	516	496	564	397	616	297
	85	542	542	567	472	616	375
	90	571	571	569	552	620	450
17500	75	530	466	581	352	630	226
	80	550	550	584	443	633	324
	85	580	580	586	536	635	419
	90	610	610	610	610	637	507
20000	75	540	501	590	372	638	232
	80	570	570	594	474	642	342
	85	601	601	596	580	643	447
	90	630	630	630	630	645	547
22500	75	548	535	598	392	644	237
	80	586	586	601	505	648	360
	85	617	617	603	603	649	471
	90	646	646	646	646	650	586

Table 35. Gross cooling capacities (MBh) — 60 ton air-cooled —standard capacity

CFM	Ent DB (°F)	Ambient Temperature (°F)																	
		85						95						105					
		Entering Wet Bulb (°F)						Entering Wet Bulb (°F)						Entering Wet Bulb (°F)					
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
14000	75	625	475	699	379	777	278	595	459	667	364	741	264	563	443	631	348	701	248
	80	631	560	700	457	778	359	602	544	668	442	742	344	570	527	633	426	702	328
	85	637	637	702	536	780	437	613	613	670	521	744	422	586	586	634	504	704	406
	90	672	672	708	621	781	515	648	648	676	605	746	500	620	620	641	589	706	484
18000	75	660	538	734	417	811	290	628	522	699	401	773	276	592	504	660	385	729	260
	80	671	651	734	516	812	390	639	628	700	500	774	376	604	604	661	483	731	359
	85	699	699	738	613	814	488	672	672	703	597	776	474	641	641	664	579	733	457
	90	738	738	746	725	816	587	710	710	715	703	777	571	678	678	677	677	735	554
21000	75	678	582	752	443	828	298	645	565	715	427	788	283	607	547	674	410	743	267
	80	694	694	754	557	829	412	665	665	717	540	790	398	633	633	677	522	745	381
	85	735	735	757	667	831	525	705	705	720	650	792	510	672	672	679	632	747	494
	90	776	776	775	775	833	636	745	745	745	745	794	620	711	711	710	710	749	603
24000	75	692	624	766	468	841	305	657	607	728	452	800	290	619	588	686	435	754	274
	80	721	721	769	594	842	433	691	691	731	578	802	419	657	657	688	560	756	402
	85	764	764	771	719	844	560	733	733	733	702	804	545	697	697	691	684	758	529
	90	806	806	806	806	846	683	774	774	773	773	806	668	737	737	737	737	760	650
27000	75	703	664	778	492	850	311	668	647	739	476	809	297	628	628	695	459	762	281
	80	744	744	780	631	852	453	713	713	741	614	810	439	677	677	698	596	763	422
	85	788	788	782	769	854	594	755	755	744	744	813	580	718	718	701	701	766	563
	90	830	830	830	830	855	729	797	797	796	796	815	714	758	758	758	758	768	696

CFM	Ent DB (°F)	Ambient Temperature (°F)					
		115					
		Entering Wet Bulb (°F)					
		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC
14000	75	536	429	596	332	659	232
	80	542	513	596	410	660	312
	85	561	561	599	487	662	389
	90	592	592	607	572	664	467
18000	75	560	488	621	368	684	243
	80	576	576	622	466	686	343
	85	610	610	625	561	688	440
	90	644	644	644	644	690	536
21000	75	572	530	633	394	696	250
	80	602	602	636	504	698	364
	85	638	638	638	614	701	476
	90	674	674	674	674	703	585
24000	75	582	571	643	418	706	257
	80	623	623	646	541	708	385
	85	660	660	648	648	710	512
	90	698	698	697	697	712	632
27000	75	590	590	651	442	713	264
	80	640	640	653	577	714	405
	85	679	679	656	656	717	546
	90	717	717	716	716	719	678

Table 36. Gross cooling capacities (MBh) — 60 ton air-cooled — high capacity

CFM	Ent DB (°F)	Ambient Temperature (°F)																	
		85						95						105					
								Entering Wet Bulb (°F)						Entering Wet Bulb (°F)					
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
14000	75	653	489	731	393	811	292	622	473	697	377	774	277	590	456	660	360	733	260
	80	659	574	731	471	812	372	629	558	699	456	775	357	596	540	662	439	734	340
	85	668	657	734	550	814	450	635	635	701	535	777	435	608	608	664	517	736	418
	90	696	696	738	635	815	528	670	670	706	619	779	513	642	642	670	602	738	496
18000	75	691	553	769	431	848	303	658	537	732	415	808	288	621	518	691	397	763	272
	80	701	665	769	530	849	404	666	647	733	514	809	388	633	623	692	496	765	371
	85	725	725	772	628	851	502	697	697	736	611	811	486	666	666	695	592	767	469
	90	765	765	784	742	852	600	736	736	749	725	813	585	703	703	708	698	768	567
21000	75	711	598	788	458	866	311	676	580	750	441	825	296	638	561	707	423	778	279
	80	721	721	789	572	867	426	692	692	752	555	826	410	659	659	709	536	780	393
	85	763	763	793	682	869	538	733	733	755	665	828	523	698	698	712	646	782	506
	90	805	805	805	805	870	650	773	773	773	773	830	634	738	738	737	737	784	616
24000	75	726	640	803	483	879	318	690	622	764	466	837	303	650	603	720	448	789	286
	80	751	751	805	610	880	447	719	719	766	593	839	431	684	684	722	574	791	414
	85	794	794	808	734	882	573	762	762	769	717	841	558	725	725	725	698	793	541
	90	837	837	836	836	884	698	803	803	803	803	842	681	765	765	765	765	795	663
27000	75	738	680	815	507	889	324	701	662	775	490	847	309	660	643	730	472	798	293
	80	775	775	817	647	891	467	742	742	777	629	848	451	705	705	732	610	799	434
	85	820	820	820	785	892	607	786	786	780	767	850	592	747	747	735	735	802	575
	90	862	862	862	862	894	744	827	827	827	827	852	727	788	788	787	787	804	709

CFM	Ent DB (°F)	Ambient Temperature (°F)					
		115					
		Entering Wet Bulb (°F)					
		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC
14000	75	561	441	624	344	690	244
	80	567	525	626	423	691	323
	85	582	582	627	500	693	401
	90	614	614	634	584	695	478
18000	75	588	501	651	380	716	254
	80	599	599	652	479	718	354
	85	634	634	655	574	720	452
	90	669	669	669	669	721	548
21000	75	601	544	664	406	729	262
	80	627	627	666	517	731	376
	85	663	663	669	627	733	488
	90	700	700	700	700	735	597
24000	75	612	585	675	430	739	268
	80	649	649	677	554	741	396
	85	687	687	680	678	743	523
	90	725	725	725	725	745	644
27000	75	621	621	684	454	747	275
	80	667	667	686	590	748	416
	85	707	707	689	689	751	557
	90	745	745	745	745	753	689

Table 37. Gross cooling capacities (MBh) — 60 ton air-cooled — high efficiency

CFM	Ent DB (°F)	Ambient Temperature (°F)																	
		85						95						105					
		Entering Wet Bulb (°F)						Entering Wet Bulb (°F)						Entering Wet Bulb (°F)					
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
14000	75	653	489	731	393	811	292	622	473	697	377	774	277	590	456	660	360	733	260
	80	659	574	731	471	812	372	629	558	698	456	775	357	596	540	661	439	734	340
	85	668	657	734	550	814	450	635	635	701	535	777	435	608	608	664	517	736	418
	90	696	696	738	635	815	528	670	670	706	619	779	513	642	642	670	602	738	496
18000	75	691	553	769	431	848	303	658	537	732	415	808	288	621	518	691	397	763	271
	80	701	665	770	531	849	404	666	647	733	514	809	388	633	623	692	497	765	371
	85	725	725	772	628	851	502	697	697	736	611	811	486	666	666	695	592	767	469
	90	765	765	784	742	852	600	736	736	749	725	813	585	703	703	708	698	768	567
21000	75	711	598	788	458	866	311	676	580	750	441	825	296	638	561	707	423	778	279
	80	721	721	789	572	867	426	692	692	752	555	826	410	659	659	709	536	780	393
	85	763	763	793	682	869	538	733	733	754	665	828	523	698	698	712	646	782	506
	90	805	805	805	805	870	650	773	773	773	773	830	634	738	738	737	737	784	616
24000	75	726	640	803	483	879	318	690	622	764	466	837	303	650	603	720	448	789	286
	80	751	751	805	610	880	447	719	719	766	593	839	431	684	684	722	574	791	414
	85	794	794	808	734	882	573	762	762	769	717	841	558	725	725	725	698	793	541
	90	837	837	836	836	884	698	803	803	803	803	842	681	765	765	765	765	795	663
27000	75	738	680	815	507	889	324	701	662	775	490	847	309	660	643	730	472	798	293
	80	775	775	817	647	891	467	742	742	777	629	848	451	705	705	732	610	799	434
	85	820	820	820	785	892	607	786	786	780	767	850	592	747	747	735	735	802	575
	90	862	862	862	862	894	744	827	827	827	827	852	727	788	788	787	787	804	709

CFM	Ent DB (°F)	Ambient Temperature (°F)					
		115					
		Entering Wet Bulb (°F)					
		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC
14000	75	561	441	624	344	690	244
	80	567	525	626	423	691	323
	85	582	582	627	500	693	401
	90	614	614	634	585	695	478
18000	75	587	501	651	380	716	254
	80	599	599	652	479	718	354
	85	634	634	655	574	720	452
	90	669	669	669	669	721	548
21000	75	601	544	664	406	729	262
	80	627	627	666	517	731	376
	85	663	663	669	627	733	488
	90	700	700	700	700	735	597
24000	75	612	585	675	430	739	268
	80	649	649	677	554	741	396
	85	687	687	680	678	743	523
	90	725	725	725	725	745	644
27000	75	621	621	683	454	747	275
	80	668	667	686	590	748	416
	85	707	707	689	689	751	557
	90	745	745	745	745	753	689

Table 38. Gross cooling capacities (MBh) — 60 ton air-cooled — eFlex™ variable speed compressor

CFM	Ent DB (°F)	Ambient Temperature (°F)																	
		85						95						105					
		Entering Wet Bulb (°F)						Entering Wet Bulb (°F)						Entering Wet Bulb (°F)					
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
14000	75	653	489	728	392	808	291	627	475	699	378	775	277	600	461	668	364	740	263
	80	658	574	729	471	809	371	632	560	699	457	776	357	605	545	669	443	741	343
	85	666	648	731	549	810	449	642	632	702	535	778	435	616	616	672	521	743	421
	90	694	694	736	634	812	527	672	672	707	620	779	513	649	649	677	605	744	499
18000	75	689	553	765	430	844	302	661	538	733	415	809	289	631	523	699	401	770	274
	80	695	662	766	529	845	403	669	644	734	515	810	389	641	626	701	500	772	374
	85	723	723	769	627	847	501	698	698	737	611	812	487	672	672	703	596	774	472
	90	763	763	781	740	848	599	736	736	750	726	813	585	709	709	716	698	775	569
21000	75	709	597	785	456	862	310	678	581	751	442	826	296	647	566	715	427	786	282
	80	725	712	786	570	864	425	693	693	752	555	827	411	666	666	717	540	787	396
	85	761	761	789	681	866	537	733	733	755	665	829	523	705	705	720	649	789	508
	90	802	802	808	795	867	649	774	774	774	774	831	635	744	744	743	743	791	619
24000	75	724	638	800	481	876	317	692	623	764	467	838	303	660	607	728	452	797	289
	80	748	748	801	608	877	446	720	720	766	593	840	432	691	691	730	577	799	417
	85	791	791	804	733	879	573	762	762	769	717	842	559	732	732	732	701	801	544
	90	834	834	833	833	881	697	804	804	804	804	844	682	772	772	771	771	803	666
27000	75	735	679	811	505	887	324	703	663	775	491	848	310	669	647	738	475	806	295
	80	772	772	813	645	888	466	743	743	778	629	850	452	712	712	740	613	808	437
	85	817	817	816	783	890	607	786	786	780	766	852	593	754	754	742	741	811	578
	90	860	860	859	859	892	743	829	829	828	828	854	728	795	795	794	794	813	712

CFM	Ent DB (°F)	Ambient Temperature (°F)					
		115					
		Entering Wet Bulb (°F)					
		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC
14000	75	578	450	641	351	707	250
	80	583	533	642	430	708	330
	85	596	596	644	508	709	407
	90	628	628	648	591	711	485
18000	75	606	510	668	387	734	261
	80	617	611	669	486	735	360
	85	648	648	671	581	737	458
	90	682	682	682	682	738	555
21000	75	620	552	682	413	747	268
	80	641	641	684	525	749	382
	85	677	677	686	634	751	494
	90	714	714	714	714	752	603
24000	75	630	593	693	437	758	275
	80	664	664	695	562	759	403
	85	702	702	697	686	761	529
	90	739	739	739	739	763	650
27000	75	639	632	702	461	766	281
	80	683	683	704	598	767	423
	85	722	722	706	706	769	563
	90	760	760	759	759	770	696

Table 39. Gross cooling capacities (MBh) — 70 ton air-cooled —standard capacity

CFM	Ent DB (°F)	Ambient Temperature (°F)																	
		85						95						105					
		Entering Wet Bulb (°F)						Entering Wet Bulb (°F)						Entering Wet Bulb (°F)					
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
16000	75	758	573	845	457	933	336	723	555	805	439	890	319	686	536	762	420	842	300
	80	766	675	846	551	934	431	731	657	808	533	891	413	694	637	765	514	843	394
	85	776	765	849	645	936	524	742	742	810	626	893	506	710	710	766	605	846	487
	90	812	812	855	747	938	616	782	782	817	728	895	598	748	748	775	708	848	579
20000	75	795	638	881	496	966	347	757	619	839	478	921	330	716	598	792	458	870	311
	80	808	770	882	611	968	463	766	745	838	592	922	445	729	719	792	572	872	426
	85	835	835	886	723	970	576	802	802	843	703	924	558	766	766	797	682	874	539
	90	880	880	900	856	972	689	845	845	853	830	926	671	808	808	807	807	875	651
22000	75	809	668	895	514	979	352	770	649	851	496	932	334	727	627	803	475	880	316
	80	822	806	895	639	980	477	782	782	853	620	933	460	745	745	805	599	882	441
	85	861	861	900	759	982	600	827	827	856	740	936	583	788	788	809	718	884	563
	90	907	907	913	897	983	723	871	871	871	871	937	705	831	831	831	831	886	684
24000	75	821	698	906	532	989	356	780	678	861	513	941	339	736	656	813	493	888	320
	80	837	837	908	666	990	492	802	802	863	646	943	474	764	764	815	625	890	455
	85	884	884	911	795	992	625	848	848	867	776	945	607	808	808	818	754	892	588
	90	930	930	930	930	993	756	893	893	892	892	946	737	851	851	851	851	894	716
26000	75	831	726	916	549	997	361	789	706	870	530	949	344	745	684	821	510	895	325
	80	856	856	918	692	998	506	820	820	873	672	951	488	780	780	823	650	897	469
	85	904	904	921	831	1000	648	867	867	876	811	952	631	826	826	827	789	899	611
	90	950	950	950	950	1002	788	912	912	911	911	954	769	869	869	868	868	901	748
27000	75	836	740	920	557	1001	363	794	720	874	538	952	346	748	698	824	518	898	327
	80	865	865	922	704	1002	513	828	828	877	684	954	495	788	788	827	663	900	476
	85	913	913	925	848	1004	660	875	875	880	828	956	643	833	833	830	806	902	623
	90	960	960	959	959	1005	803	920	920	920	920	957	785	877	877	876	876	904	764

CFM	Ent DB (°F)	Ambient Temperature (°F)					
		115					
		Entering Wet Bulb (°F)					
		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC
16000	75	651	518	720	401	792	281
	80	659	619	720	494	794	375
	85	679	679	724	585	796	467
	90	715	715	733	687	798	559
20000	75	676	578	745	438	817	292
	80	690	690	747	551	819	406
	85	729	729	750	660	821	519
	90	768	768	768	768	823	629
22000	75	686	607	755	455	826	296
	80	709	709	757	577	828	421
	85	749	749	760	697	830	543
	90	789	789	789	789	832	662
24000	75	694	635	763	473	833	301
	80	725	725	766	603	835	435
	85	767	767	769	732	837	568
	90	807	807	807	807	839	695
26000	75	701	663	770	489	839	306
	80	740	740	773	628	841	449
	85	782	782	776	767	843	591
	90	823	823	823	823	845	726
27000	75	704	676	773	498	842	308
	80	747	747	776	641	844	456
	85	790	790	779	778	846	603
	90	830	830	830	830	848	742

Table 40. Gross cooling capacities (MBh) — 70 ton air-cooled —high efficiency

CFM	Ent DB (°F)	Ambient Temperature (°F)																	
		85						95						105					
		Entering Wet Bulb (°F)						Entering Wet Bulb (°F)						Entering Wet Bulb (°F)					
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
16000	75	755	572	839	454	923	332	721	554	800	437	882	315	684	535	759	418	837	298
	80	763	674	839	548	924	426	729	656	803	531	883	410	691	636	759	511	838	392
	85	773	763	843	642	926	519	740	740	804	623	885	503	708	708	763	604	840	485
	90	808	808	849	744	927	612	778	778	811	725	887	595	745	745	771	706	842	577
20000	75	791	636	873	492	956	342	754	617	832	474	912	326	712	596	788	456	864	308
	80	804	767	873	607	957	458	768	749	832	589	914	442	725	716	788	570	866	423
	85	831	831	877	719	959	571	798	798	836	700	916	555	763	763	793	680	868	536
	90	873	873	891	852	960	685	840	840	847	826	917	668	804	804	803	803	869	648
22000	75	805	666	886	510	967	347	766	647	844	492	923	331	723	625	799	474	874	313
	80	817	802	886	635	969	473	778	778	845	617	925	456	742	742	801	597	875	438
	85	855	855	890	755	971	596	821	821	849	736	927	579	785	785	804	716	877	561
	90	899	899	905	891	972	719	864	864	864	864	928	701	827	827	826	826	879	681
24000	75	816	695	897	528	977	352	776	675	854	510	932	336	732	654	808	491	882	318
	80	832	832	898	662	979	488	798	798	856	643	934	471	761	761	810	623	883	452
	85	877	877	901	791	981	620	842	842	859	772	936	604	804	804	814	752	885	585
	90	921	921	921	921	982	751	886	886	885	885	937	733	846	846	846	846	887	713
26000	75	825	723	906	544	986	357	785	703	863	527	940	340	740	682	816	508	888	322
	80	850	850	908	687	987	502	815	815	865	668	941	485	777	777	818	648	890	467
	85	896	896	910	826	989	644	860	860	868	807	943	627	821	821	821	787	892	609
	90	941	941	941	941	990	783	904	904	904	904	944	765	863	863	863	863	893	745
27000	75	830	737	910	553	989	359	789	717	867	535	943	343	744	696	820	516	891	325
	80	859	859	912	700	991	509	823	823	869	681	945	492	784	784	822	660	893	473
	85	905	905	915	843	992	656	869	869	872	824	946	639	829	829	825	804	895	620
	90	950	950	950	950	994	799	913	913	912	912	948	781	871	871	870	870	896	761

CFM	Ent DB (°F)	Ambient Temperature (°F)					
		115					
		Entering Wet Bulb (°F)					
		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC
16000	75	643	514	716	399	788	279
	80	652	615	715	492	790	373
	85	675	675	720	584	792	466
	90	712	712	730	686	794	558
20000	75	670	575	742	436	812	290
	80	686	686	744	550	814	404
	85	726	726	747	659	816	517
	90	765	765	765	765	817	627
22000	75	680	604	751	454	820	294
	80	705	705	754	576	822	419
	85	746	746	757	695	824	541
	90	785	785	785	785	825	660
24000	75	689	633	760	471	827	299
	80	722	722	762	602	829	433
	85	764	764	765	730	831	565
	90	803	803	803	803	832	692
26000	75	696	660	766	488	833	303
	80	737	737	769	627	835	447
	85	779	779	772	765	836	589
	90	818	818	817	817	838	724
27000	75	699	674	770	496	836	306
	80	744	744	772	639	837	454
	85	786	786	775	774	839	601
	90	824	824	824	824	840	739

Table 41. Gross cooling capacities (MBh) — 70 ton air-cooled — eFlex™ variable speed compressor

CFM	Ent DB (°F)	Ambient Temperature (°F)																	
		85						95						105					
		Entering Wet Bulb (°F)						Entering Wet Bulb (°F)						Entering Wet Bulb (°F)					
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
16000	75	762	575	846	459	933	337	732	559	812	443	895	322	701	543	777	427	855	306
	80	769	679	847	552	934	432	739	662	812	536	897	416	708	646	778	520	857	400
	85	782	752	851	645	936	525	754	733	816	629	899	509	726	714	781	612	859	493
	90	814	814	857	749	938	617	787	787	823	732	901	602	760	760	788	715	860	585
20000	75	797	640	882	497	967	348	765	623	845	481	927	333	732	606	807	464	884	316
	80	808	756	884	612	969	464	777	735	847	595	928	448	746	714	808	578	886	432
	85	837	837	887	724	971	577	808	808	850	707	931	561	778	778	811	689	888	544
	90	881	881	898	838	973	689	851	851	865	816	932	673	819	819	829	794	890	656
22000	75	812	671	896	515	980	353	777	653	857	499	938	337	743	636	818	482	894	321
	80	828	789	897	639	981	479	796	767	859	622	940	463	764	746	819	605	896	446
	85	863	863	900	761	983	602	833	833	862	743	942	586	801	801	823	725	899	569
	90	908	908	920	876	985	723	876	876	885	854	944	707	843	843	849	831	901	690
24000	75	823	700	907	533	990	358	788	682	868	516	947	342	752	664	827	499	903	326
	80	846	821	908	666	991	493	814	800	869	649	949	477	777	777	828	631	905	461
	85	886	886	912	797	994	626	854	854	873	779	952	610	820	820	832	761	907	593
	90	931	931	939	913	995	757	899	899	898	898	953	740	864	864	863	863	909	723
26000	75	833	728	916	550	998	362	797	710	877	533	955	347	760	692	835	516	910	331
	80	858	858	918	692	1000	507	826	826	879	675	957	491	793	793	838	657	912	475
	85	905	905	922	832	1002	650	873	873	882	814	960	634	838	838	841	795	915	617
	90	952	952	952	952	1004	789	918	918	918	918	962	772	882	882	881	881	917	755

CFM	Ent DB (°F)	Ambient Temperature (°F)					
		115					
		Entering Wet Bulb (°F)					
		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC
16000	75	677	531	746	413	818	291
	80	679	630	746	506	819	385
	85	701	701	750	597	821	477
	90	736	736	757	700	822	569
20000	75	704	592	772	449	843	301
	80	719	696	773	562	844	416
	85	751	751	776	672	846	528
	90	789	789	796	773	848	639
22000	75	713	621	782	467	852	306
	80	735	728	783	589	853	430
	85	771	771	786	708	855	553
	90	811	811	810	810	857	673
24000	75	722	649	790	484	859	310
	80	749	749	792	615	861	445
	85	789	789	795	744	863	577
	90	829	829	829	829	865	705
26000	75	729	676	797	500	866	315
	80	763	763	799	640	867	459
	85	805	805	802	773	869	601
	90	845	845	845	845	871	737

Table 42. Gross cooling capacities (MBh) — 75 ton air-cooled —standard capacity

CFM	Ent DB (°F)	Ambient Temperature (°F)																	
		85						95						105					
		Entering Wet Bulb (°F)						Entering Wet Bulb (°F)						Entering Wet Bulb (°F)					
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
16000	75	827	610	919	492	1012	366	790	590	878	472	966	348	753	571	835	452	917	328
	80	833	714	920	586	1013	463	797	694	879	567	967	444	761	675	836	547	918	424
	85	844	814	924	681	1014	557	805	788	883	662	969	538	771	764	839	641	920	517
	90	870	870	928	786	1016	651	840	840	888	766	971	631	807	807	846	745	922	611
20000	75	868	678	961	531	1047	376	829	658	916	511	998	357	788	637	869	491	945	337
	80	880	810	962	648	1048	494	841	789	916	627	999	475	801	769	870	607	946	454
	85	899	899	964	762	1050	608	865	865	920	741	1001	589	828	828	873	719	948	568
	90	945	945	977	896	1052	723	909	909	934	876	1003	703	871	871	888	854	950	683
22000	75	884	709	976	550	1059	381	843	688	930	530	1009	362	801	667	881	509	955	342
	80	900	857	976	676	1060	508	853	830	930	656	1010	489	815	802	882	635	956	468
	85	928	928	980	800	1062	633	892	892	934	778	1012	613	853	853	886	756	957	592
	90	975	975	996	950	1064	758	937	937	946	921	1013	738	896	896	896	896	959	716
24000	75	898	739	988	567	1069	385	855	717	941	547	1017	366	812	696	891	526	962	346
	80	911	892	989	704	1070	522	868	868	942	684	1019	503	829	829	893	662	963	482
	85	953	953	993	836	1072	656	915	915	946	815	1020	637	875	875	896	792	965	616
	90	1000	1000	1007	989	1073	791	960	960	960	960	1021	770	918	918	917	917	966	748
26000	75	910	768	999	584	1077	389	866	746	951	564	1024	370	821	724	900	543	968	350
	80	925	925	1001	731	1078	536	887	887	953	710	1026	516	847	847	902	687	969	496
	85	975	975	1004	871	1079	680	936	936	956	850	1027	660	893	893	905	827	970	639
	90	1022	1022	1021	1021	1081	823	980	980	980	980	1028	802	935	935	935	935	972	779
27000	75	915	782	1004	593	1080	391	871	760	955	572	1028	372	825	738	904	551	971	352
	80	935	935	1005	744	1081	542	897	897	957	722	1029	523	856	856	906	700	972	502
	85	985	985	1008	889	1083	691	945	945	960	867	1030	671	902	902	909	844	973	651
	90	1031	1031	1031	1031	1084	838	989	989	989	989	1031	817	943	943	942	942	974	795

CFM	Ent DB (°F)	Ambient Temperature (°F)					
		115					
		Entering Wet Bulb (°F)					
		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC
16000	75	727	558	796	435	868	309
	80	733	660	798	529	869	404
	85	743	743	800	623	871	497
	90	778	778	806	725	873	591
20000	75	755	620	823	471	891	318
	80	763	745	823	587	893	434
	85	795	795	827	698	894	547
	90	833	833	839	823	896	661
22000	75	765	649	834	489	899	322
	80	777	777	835	614	901	448
	85	815	815	839	735	902	571
	90	855	855	855	855	903	694
24000	75	774	677	843	506	906	326
	80	794	794	845	640	907	461
	85	835	835	848	770	908	595
	90	874	874	873	873	909	725
26000	75	782	705	850	522	911	329
	80	809	809	852	665	912	475
	85	851	851	855	805	912	618
	90	888	888	888	888	913	756
27000	75	785	718	854	531	913	331
	80	816	816	856	678	914	481
	85	858	858	858	822	914	629
	90	895	895	894	894	915	772

Table 43. Gross cooling capacities (MBh) — 75 ton air-cooled —high capacity

CFM	Ent DB (°F)	Ambient Temperature (°F)																	
		85						95						105					
		Entering Wet Bulb (°F)						Entering Wet Bulb (°F)						Entering Wet Bulb (°F)					
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
16000	75	852	624	946	504	1041	378	814	604	904	484	994	358	776	584	860	464	944	338
	80	857	729	948	600	1042	475	821	708	905	580	995	455	784	688	862	560	945	435
	85	868	829	951	696	1044	570	826	805	909	675	997	550	793	780	865	654	947	529
	90	892	892	955	801	1046	664	861	861	914	780	999	644	828	828	870	759	949	623
20000	75	894	692	990	544	1078	388	855	672	944	524	1028	368	813	651	895	503	973	348
	80	906	825	990	661	1080	506	866	804	945	641	1029	486	826	783	896	619	975	465
	85	922	922	993	777	1081	621	887	887	948	756	1031	601	850	850	900	733	976	580
	90	969	969	1005	912	1083	737	933	933	961	891	1032	717	894	894	914	868	978	695
22000	75	912	724	1005	563	1091	392	869	703	958	542	1039	372	826	681	908	521	983	352
	80	927	873	1006	690	1092	521	877	849	959	670	1040	501	838	820	909	648	985	479
	85	952	952	1010	815	1094	646	915	915	963	793	1042	626	876	876	913	770	986	604
	90	1000	1000	1025	967	1095	772	961	961	972	941	1044	751	920	920	927	910	987	730
24000	75	926	754	1019	581	1101	396	882	732	970	560	1048	377	838	710	919	538	991	356
	80	937	912	1019	719	1102	535	898	884	971	698	1049	514	852	852	920	675	992	493
	85	978	978	1023	852	1104	670	939	939	975	830	1051	650	898	898	924	807	994	628
	90	1026	1026	1035	1010	1105	806	986	986	985	985	1052	785	942	942	942	942	995	762
26000	75	938	784	1030	598	1110	400	893	761	981	577	1055	380	847	738	928	555	997	360
	80	950	950	1031	746	1111	548	912	912	982	724	1057	528	871	871	930	701	999	507
	85	1001	1001	1034	887	1112	693	961	961	985	865	1058	673	918	918	933	842	1000	651
	90	1049	1049	1048	1048	1113	838	1006	1006	1006	1006	1059	816	960	960	960	960	1001	793
27000	75	944	798	1035	606	1113	402	898	775	985	585	1059	382	851	752	932	563	1000	362
	80	960	960	1036	759	1114	555	921	921	987	737	1060	535	880	880	934	714	1001	513
	85	1011	1011	1039	905	1116	705	970	970	990	883	1061	684	926	926	937	859	1002	663
	90	1059	1059	1058	1058	1117	854	1015	1015	1015	1015	1062	832	968	968	968	968	1003	809

CFM	Ent DB (°F)	Ambient Temperature (°F)					
		115					
		Entering Wet Bulb (°F)					
		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC
16000	75	750	571	821	446	894	319
	80	756	673	822	541	895	415
	85	766	761	824	636	897	509
	90	799	799	830	739	899	602
20000	75	779	633	849	483	919	327
	80	786	762	850	599	920	444
	85	817	817	853	712	922	559
	90	856	856	863	840	923	674
22000	75	790	663	860	500	927	331
	80	799	799	861	627	928	458
	85	838	838	865	749	930	583
	90	879	879	878	878	931	707
24000	75	800	691	870	518	933	335
	80	817	817	872	654	935	472
	85	858	858	874	784	936	606
	90	898	898	897	897	937	739
26000	75	807	719	878	534	939	339
	80	832	832	880	679	940	485
	85	875	875	882	819	940	629
	90	913	913	913	913	941	770
27000	75	811	733	881	543	941	341
	80	839	839	883	691	942	492
	85	883	883	886	836	942	641
	90	920	920	919	919	943	785

Table 44. Gross cooling capacities (MBh) — 75 ton air-cooled —high efficiency

CFM	Ent DB (°F)	Ambient Temperature (°F)																	
		85						95						105					
		Entering Wet Bulb (°F)						Entering Wet Bulb (°F)						Entering Wet Bulb (°F)					
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
16000	75	849	622	938	500	1028	372	810	602	899	482	984	354	771	581	856	462	934	334
	80	853	726	939	596	1029	469	817	706	899	577	985	451	778	686	857	557	936	431
	85	864	827	942	691	1030	564	823	802	903	673	986	545	788	777	861	653	937	525
	90	888	888	946	796	1032	658	856	856	908	777	988	639	824	824	866	757	939	619
20000	75	888	689	979	539	1062	381	849	669	936	521	1013	363	808	648	890	500	960	342
	80	900	822	979	656	1063	500	861	802	939	638	1015	481	821	781	890	617	961	460
	85	916	916	982	772	1065	615	883	883	940	752	1016	595	847	847	894	731	962	574
	90	961	961	994	907	1066	730	927	927	953	887	1018	711	889	889	907	865	963	689
22000	75	905	721	994	558	1073	385	864	700	950	539	1023	366	822	678	902	518	968	346
	80	919	869	994	685	1074	514	880	849	951	666	1024	494	834	817	902	645	969	473
	85	944	944	998	810	1076	639	910	910	954	789	1026	619	872	872	906	767	970	598
	90	990	990	1013	961	1077	765	954	954	963	935	1027	745	913	913	919	905	971	723
24000	75	918	750	1006	575	1082	389	877	730	961	556	1031	370	833	708	912	535	974	349
	80	930	907	1007	713	1083	527	892	880	962	694	1032	508	849	849	913	672	975	487
	85	969	969	1010	846	1084	662	933	933	965	825	1033	643	893	893	916	803	975	621
	90	1015	1015	1023	1002	1085	798	977	977	976	976	1034	778	933	933	933	933	976	754
26000	75	929	779	1017	592	1089	393	888	758	971	573	1037	374	843	736	920	552	979	353
	80	942	942	1017	740	1090	540	906	906	972	720	1038	521	867	867	922	698	979	500
	85	991	991	1021	881	1091	685	953	953	975	861	1038	666	911	911	924	838	980	644
	90	1036	1036	1036	1036	1092	830	996	996	995	995	1039	809	949	949	949	949	980	785
27000	75	934	793	1021	600	1092	394	892	773	975	581	1039	375	847	750	924	560	981	355
	80	952	952	1023	753	1093	547	915	915	976	732	1040	527	875	875	925	710	981	506
	85	1000	1000	1025	899	1094	697	962	962	979	878	1041	677	919	919	928	855	981	655
	90	1045	1045	1045	1045	1096	845	1004	1004	1003	1003	1042	824	956	956	956	956	982	800

CFM	Ent DB (°F)	Ambient Temperature (°F)					
		115					
		Entering Wet Bulb (°F)					
		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC
16000	75	732	561	812	442	882	314
	80	741	665	814	537	883	410
	85	751	751	817	632	885	504
	90	790	790	823	735	886	597
20000	75	766	627	842	479	902	321
	80	780	760	842	596	903	438
	85	810	810	846	708	904	552
	90	849	849	858	838	905	667
22000	75	778	656	852	497	909	324
	80	790	790	853	624	909	451
	85	832	832	856	745	910	575
	90	870	870	869	869	911	699
24000	75	788	686	860	514	913	328
	80	809	809	862	650	914	464
	85	851	851	864	780	914	598
	90	886	886	886	886	915	730
26000	75	797	714	867	530	917	331
	80	826	826	869	674	917	477
	85	866	866	871	814	917	621
	90	899	899	898	898	917	760
27000	75	801	728	870	538	918	333
	80	833	833	872	687	918	484
	85	873	873	874	831	918	632
	90	904	904	903	903	918	775

Table 45. Gross cooling capacities (MBh) — 75 ton air-cooled — eFlex™ variable speed compressor

CFM	Ent DB (°F)	Ambient Temperature (°F)																	
		85						95						105					
		Entering Wet Bulb (°F)						Entering Wet Bulb (°F)						Entering Wet Bulb (°F)					
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
16000	75	831	612	921	492	1007	367	794	592	878	472	960	348	755	572	833	452	907	327
	80	835	707	923	587	1008	461	798	687	880	567	961	442	760	666	835	546	909	420
	85	840	809	925	682	1010	555	806	784	883	662	962	535	771	759	838	640	910	513
	90	872	872	930	777	1012	648	840	840	888	756	964	628	805	805	844	734	912	606
20000	75	872	680	960	531	1037	375	831	658	914	511	985	355	788	636	865	489	928	333
	80	883	796	963	647	1038	490	842	775	917	626	986	470	793	761	867	605	929	448
	85	900	900	967	763	1039	604	865	865	921	742	988	583	827	827	872	719	930	561
	90	946	946	976	877	1041	718	908	908	932	856	989	697	868	868	877	841	931	675
22000	75	889	711	975	549	1046	378	846	689	927	528	993	358	802	667	876	507	934	336
	80	894	850	977	675	1047	503	854	823	930	654	994	483	813	794	879	633	935	460
	85	929	929	983	801	1048	627	891	891	936	779	995	606	851	851	886	756	935	584
	90	974	974	986	938	1050	752	934	934	943	909	997	731	891	891	890	890	937	707
24000	75	903	741	986	566	1053	381	860	719	938	546	998	361	814	696	885	523	938	339
	80	914	883	989	703	1055	516	873	855	940	682	1000	495	827	827	888	659	939	473
	85	953	953	996	837	1056	650	914	914	948	815	1001	629	871	871	897	791	939	607
	90	997	997	1005	974	1059	785	956	956	955	955	1003	763	909	909	909	909	942	738
26000	75	916	771	996	583	1060	384	872	749	947	562	1004	364	825	725	893	540	942	342
	80	926	926	999	729	1062	529	887	887	950	708	1005	508	845	845	896	685	942	486
	85	974	974	1008	872	1063	674	933	933	959	850	1006	652	888	888	906	826	943	631
	90	1017	1017	1016	1016	1067	817	973	973	972	972	1009	794	922	922	922	922	944	768
27000	75	922	785	1000	591	1064	386	878	763	950	570	1006	365	830	739	896	548	943	343
	80	936	936	1003	742	1065	536	896	896	954	721	1007	515	853	853	900	697	944	492
	85	983	983	1013	890	1067	685	941	941	964	867	1008	665	895	895	910	843	944	642
	90	1025	1025	1024	1024	1070	862	979	979	979	979	1052	856	927	927	927	927	947	783

CFM	Ent DB (°F)	Ambient Temperature (°F)					
		115					
		Entering Wet Bulb (°F)					
		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC
16000	75	720	554	787	431	851	305
	80	726	648	789	525	853	398
	85	736	736	792	619	854	491
	90	771	771	798	711	856	583
20000	75	748	616	814	467	867	310
	80	755	734	817	582	868	424
	85	787	787	822	695	868	537
	90	825	825	830	810	869	651
22000	75	760	645	823	484	870	313
	80	769	769	826	610	871	437
	85	808	808	833	732	871	560
	90	843	843	843	843	873	682
24000	75	769	674	831	501	874	316
	80	786	786	834	635	874	449
	85	826	826	842	767	874	583
	90	857	857	857	857	874	711
26000	75	779	702	837	517	876	318
	80	802	802	841	660	876	462
	85	839	839	850	801	875	606
	90	865	865	865	865	877	741
27000	75	783	716	840	525	877	320
	80	809	809	844	672	876	475
	85	845	845	853	818	876	616
	90	869	869	868	868	878	756

Table 46. Gross cooling capacities (MBh) — 90 ton air-cooled —standard capacity

CFM	Ent DB (°F)	Ambient Temperature (°F)																	
		85						95						105					
		Entering Wet Bulb (°F)						Entering Wet Bulb (°F)						Entering Wet Bulb (°F)					
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
27000	75	1007	799	1106	624	1208	432	965	777	1061	604	1158	413	922	753	1013	582	1104	392
	80	1020	972	1110	766	1212	580	981	950	1066	744	1162	561	938	927	1017	721	1109	540
	85	1052	1052	1116	903	1216	728	1016	1016	1072	881	1167	708	977	977	1024	858	1114	687
	90	1106	1106	1131	1082	1220	862	1069	1069	1088	1060	1171	840	1028	1028	1028	1028	1118	817
32000	75	1037	865	1136	666	1235	444	994	842	1089	645	1183	425	948	818	1038	623	1127	404
	80	1049	1049	1141	825	1240	615	1012	1012	1094	802	1188	596	972	972	1043	778	1133	575
	85	1106	1106	1147	984	1244	783	1068	1068	1100	962	1193	763	1026	1026	1049	938	1137	742
	90	1162	1162	1161	1161	1248	935	1122	1122	1121	1121	1197	913	1078	1078	1077	1077	1142	890
37000	75	1060	927	1158	705	1255	456	1015	903	1109	684	1201	436	967	878	1056	662	1143	416
	80	1090	1090	1163	880	1261	648	1051	1051	1115	857	1207	628	1008	1008	1063	832	1150	607
	85	1149	1149	1169	1061	1265	838	1108	1108	1120	1038	1212	818	1063	1063	1068	1013	1155	797
	90	1205	1205	1205	1205	1269	1005	1162	1162	1162	1162	1216	983	1116	1116	1115	1115	1159	959
42000	75	1077	985	1175	742	1271	467	1032	961	1125	721	1216	447	982	936	1071	699	1156	427
	80	1123	1123	1181	932	1277	680	1081	1081	1131	909	1222	660	1036	1036	1077	884	1164	639
	85	1183	1183	1186	1134	1281	891	1139	1139	1136	1111	1226	871	1092	1092	1082	1082	1168	850
	90	1240	1240	1239	1239	1284	1072	1195	1195	1194	1194	1230	1049	1145	1145	1145	1145	1172	1025
45000	75	1086	1018	1183	763	1279	473	1040	994	1132	742	1223	453	990	968	1078	720	1163	432
	80	1140	1140	1189	962	1280	698	1097	1097	1139	939	1224	678	1051	1051	1085	913	1164	657
	85	1200	1200	1194	1176	1288	922	1155	1155	1144	1144	1233	902	1107	1107	1089	1089	1175	854
	90	1257	1257	1257	1257	1292	1111	1211	1211	1210	1210	1237	1088	1160	1160	1160	1160	1178	1063

CFM	Ent DB (°F)	Ambient Temperature (°F)					
		115					
		Entering Wet Bulb (°F)					
		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC
27000	75	875	729	961	560	1046	371
	80	886	886	966	696	1051	518
	85	936	936	972	833	1056	662
	90	985	985	984	984	1060	792
32000	75	899	792	983	601	1066	383
	80	928	928	990	753	1073	552
	85	980	980	995	912	1077	719
	90	1030	1030	1029	1029	1082	864
37000	75	917	852	1000	639	1081	394
	80	962	962	1007	806	1088	585
	85	1014	1014	1012	987	1093	774
	90	1064	1064	1064	1064	1097	932
42000	75	930	909	1013	676	1092	404
	80	988	988	1020	857	1094	616
	85	1041	1041	1025	1025	1105	801
	90	1091	1091	1091	1091	1108	998
45000	75	937	937	1019	697	1098	410
	80	1001	1001	1026	886	1099	635
	85	1054	1054	1031	1031	1111	827
	90	1105	1105	1104	1104	1114	1036

Table 47. Gross cooling capacities (MBh) — 90 ton air-cooled —high capacity and high efficiency

CFM	Ent DB (°F)	Ambient Temperature (°F)																	
		85						95						105					
		Entering Wet Bulb (°F)						Entering Wet Bulb (°F)						Entering Wet Bulb (°F)					
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
27000	75	1071	853	1176	665	1278	459	1028	830	1130	645	1227	440	982	805	1079	623	1173	419
	80	1087	1013	1179	815	1282	616	1046	990	1134	793	1233	596	1001	966	1084	769	1179	576
	85	1122	1122	1184	962	1284	771	1085	1085	1139	940	1235	750	1044	1044	1089	916	1182	727
	90	1176	1176	1200	1122	1287	914	1139	1139	1156	1100	1239	893	1097	1097	1108	1076	1186	870
32000	75	1103	926	1206	712	1307	472	1059	903	1158	691	1254	452	1010	877	1106	669	1197	432
	80	1121	1121	1211	880	1311	656	1082	1082	1163	857	1260	636	1040	1040	1111	833	1204	615
	85	1179	1179	1214	1052	1313	828	1140	1140	1167	1030	1262	806	1096	1096	1116	1005	1207	783
	90	1235	1235	1235	1235	1314	995	1195	1195	1194	1194	1264	974	1150	1150	1149	1149	1210	950
37000	75	1127	997	1229	757	1328	484	1081	972	1179	736	1274	465	1031	946	1125	714	1215	444
	80	1165	1165	1233	942	1332	693	1124	1124	1184	919	1280	673	1079	1079	1131	894	1223	653
	85	1224	1224	1236	1140	1333	882	1182	1182	1188	1117	1282	860	1136	1136	1135	1092	1225	836
	90	1280	1280	1279	1279	1333	1074	1237	1237	1236	1236	1282	1052	1189	1189	1189	1189	1226	1029
42000	75	1145	1064	1246	799	1345	496	1098	1039	1195	780	1289	477	1047	1013	1140	756	1229	456
	80	1200	1200	1250	1002	1349	729	1157	1157	1201	979	1295	710	1111	1111	1146	953	1237	689
	85	1259	1259	1252	1224	1349	934	1216	1216	1203	1201	1296	912	1168	1168	1149	1149	1239	888
	90	1314	1314	1314	1314	1347	1151	1270	1270	1269	1269	1295	1129	1220	1220	1220	1220	1238	1105
45000	75	1154	1103	1255	824	1354	503	1106	1078	1204	805	1297	484	1055	1052	1148	756	1236	463
	80	1217	1217	1259	1037	1357	751	1174	1174	1208	1013	1303	731	1126	1126	1154	988	1245	711
	85	1277	1277	1260	1260	1356	965	1232	1232	1210	1210	1303	943	1183	1183	1156	1156	1245	918
	90	1332	1332	1331	1331	1355	1197	1286	1286	1286	1286	1302	1174	1236	1236	1235	1235	1244	1150

CFM	Ent DB (°F)	Ambient Temperature (°F)					
		115					
		Entering Wet Bulb (°F)					
		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC
27000	75	934	779	1026	600	1114	397
	80	954	940	1031	743	1121	554
	85	1001	1001	1036	890	1124	702
	90	1052	1052	1057	1050	1128	845
32000	75	959	851	1050	646	1135	410
	80	995	995	1056	807	1144	593
	85	1049	1049	1060	979	1147	757
	90	1100	1100	1100	1100	1150	925
37000	75	978	919	1068	691	1152	422
	80	1031	1031	1074	867	1161	630
	85	1086	1086	1078	1065	1164	810
	90	1137	1137	1137	1137	1165	1003
42000	75	993	985	1082	708	1164	434
	80	1060	1060	1088	926	1174	667
	85	1115	1115	1090	1090	1176	861
	90	1166	1166	1165	1165	1176	1079
45000	75	1000	1000	1089	728	1170	441
	80	1075	1075	1094	960	1181	689
	85	1129	1129	1097	1097	1182	891
	90	1180	1180	1179	1179	1181	1123

Table 48. Gross cooling capacities (MBh) — 105 ton air-cooled —high capacity

CFM	Ent DB (°F)	Ambient Temperature (°F)																	
		85						95						105					
		Entering Wet Bulb (°F)						Entering Wet Bulb (°F)						Entering Wet Bulb (°F)					
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
31000	75	1175	944	1290	736	1404	505	1127	919	1238	713	1346	483	1075	891	1181	688	1284	460
	80	1194	1138	1294	903	1408	681	1148	1112	1242	878	1352	659	1097	1085	1186	851	1290	636
	85	1235	1235	1300	1067	1413	856	1193	1193	1249	1042	1356	834	1147	1147	1192	1015	1295	810
	90	1296	1296	1320	1263	1416	1015	1253	1253	1270	1238	1360	991	1206	1206	1205	1205	1299	965
35000	75	1200	1000	1314	770	1426	515	1151	974	1260	747	1367	493	1097	946	1201	722	1302	470
	80	1215	1215	1319	953	1431	711	1172	1172	1265	927	1373	689	1125	1125	1207	900	1309	665
	85	1280	1279	1324	1136	1435	906	1235	1235	1271	1111	1377	883	1187	1187	1213	1083	1313	860
	90	1342	1342	1341	1341	1438	1078	1296	1296	1296	1296	1380	1053	1246	1246	1245	1245	1317	1026
39000	75	1220	1054	1333	804	1444	524	1169	1027	1277	781	1383	502	1114	999	1217	756	1317	479
	80	1251	1251	1338	1000	1449	739	1206	1206	1283	975	1389	717	1157	1157	1224	947	1324	693
	85	1316	1316	1343	1203	1452	954	1270	1270	1289	1177	1393	932	1219	1219	1229	1149	1328	908
	90	1380	1380	1379	1379	1455	1138	1332	1332	1331	1331	1396	1113	1279	1279	1278	1278	1332	1086
43000	75	1237	1105	1348	837	1458	533	1185	1078	1292	813	1396	511	1128	1049	1230	788	1329	488
	80	1281	1281	1354	1046	1463	767	1235	1235	1298	1020	1403	745	1183	1183	1237	992	1337	721
	85	1347	1347	1358	1267	1466	997	1299	1299	1303	1241	1406	975	1247	1247	1242	1212	1341	951
	90	1411	1411	1410	1410	1469	1197	1361	1361	1361	1361	1409	1172	1306	1306	1306	1306	1344	1144
44000	75	1240	1118	1352	845	1461	536	1188	1091	1295	821	1399	514	1131	1062	1233	796	1332	490
	80	1288	1288	1357	1058	1467	774	1241	1241	1301	1031	1406	751	1190	1190	1240	1003	1340	728
	85	1354	1354	1362	1283	1470	1009	1306	1306	1306	1257	1409	986	1253	1253	1245	1228	1343	962
	90	1418	1418	1418	1418	1472	1211	1368	1368	1367	1367	1412	1186	1312	1312	1312	1312	1346	1159
46000	75	1247	1143	1358	860	1468	540	1194	1116	1301	837	1405	518	1137	1086	1239	812	1337	495
	80	1301	1301	1364	1080	1473	787	1253	1253	1307	1053	1411	765	1201	1201	1246	1025	1345	741
	85	1368	1368	1368	1314	1476	1031	1318	1318	1312	1288	1414	1009	1264	1264	1250	1250	1349	958
	90	1431	1431	1431	1431	1478	1240	1380	1380	1380	1380	1417	1214	1324	1324	1323	1323	1351	1187

CFM	Ent DB (°F)	Ambient Temperature (°F)					
		115					
		Entering Wet Bulb (°F)					
		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC
31000	75	1020	862	1119	662	1216	435
	80	1039	1039	1125	822	1223	610
	85	1097	1097	1131	986	1228	784
	90	1153	1153	1153	1153	1232	936
35000	75	1040	916	1138	696	1232	445
	80	1075	1075	1144	870	1240	640
	85	1134	1134	1150	1053	1245	834
	90	1190	1190	1190	1190	1249	997
39000	75	1055	968	1152	729	1245	454
	80	1104	1104	1159	916	1254	668
	85	1164	1164	1164	1118	1258	883
	90	1221	1221	1220	1220	1262	1056
43000	75	1068	1018	1164	761	1256	463
	80	1128	1128	1171	961	1265	695
	85	1189	1189	1176	1176	1269	925
	90	1246	1246	1245	1245	1272	1114
44000	75	1071	1030	1167	769	1258	465
	80	1134	1134	1174	972	1268	702
	85	1194	1194	1179	1179	1272	909
	90	1251	1251	1251	1251	1274	1128
46000	75	1076	1055	1172	785	1263	470
	80	1144	1144	1179	994	1272	716
	85	1205	1205	1184	1184	1276	928
	90	1262	1262	1261	1261	1279	1157

Table 49. Gross cooling capacities (MBh) — 115 ton air-cooled —standard capacity

CFM	Ent DB (°F)	Ambient Temperature (°F)																	
		85						95						105					
		Entering Wet Bulb (°F)						Entering Wet Bulb (°F)						Entering Wet Bulb (°F)					
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
31000	75	1229	989	1350	770	1468	528	1180	962	1296	746	1409	506	1126	933	1237	721	1345	483
	80	1249	1179	1354	944	1472	713	1201	1153	1301	919	1415	690	1149	1124	1243	891	1352	667
	85	1293	1293	1360	1116	1474	894	1250	1250	1307	1091	1417	869	1202	1202	1249	1063	1355	842
	90	1356	1356	1380	1307	1478	1061	1312	1312	1329	1282	1422	1036	1263	1263	1273	1254	1359	1009
35000	75	1256	1048	1375	808	1491	539	1204	1021	1320	784	1430	517	1148	992	1259	758	1364	493
	80	1282	1267	1380	997	1496	744	1229	1229	1325	971	1436	722	1180	1180	1265	943	1372	698
	85	1340	1340	1384	1190	1498	940	1295	1295	1330	1164	1439	915	1245	1245	1270	1136	1375	888
	90	1404	1404	1404	1404	1500	1127	1358	1358	1358	1358	1442	1102	1306	1306	1306	1306	1379	1075
39000	75	1277	1106	1395	843	1509	549	1224	1078	1338	821	1447	527	1167	1048	1276	795	1380	503
	80	1311	1311	1400	1048	1514	774	1265	1265	1344	1022	1454	752	1214	1214	1283	993	1388	728
	85	1379	1379	1404	1261	1516	984	1332	1332	1349	1235	1456	959	1279	1279	1287	1206	1391	932
	90	1444	1444	1443	1443	1518	1191	1395	1395	1395	1395	1458	1166	1341	1341	1341	1341	1394	1139
43000	75	1294	1161	1411	879	1525	559	1240	1134	1354	855	1461	536	1182	1103	1290	829	1393	512
	80	1343	1343	1416	1098	1529	804	1296	1296	1359	1071	1468	782	1243	1243	1297	1042	1401	758
	85	1412	1412	1420	1331	1531	1028	1363	1363	1363	1304	1470	1002	1309	1309	1301	1275	1404	974
	90	1476	1476	1476	1476	1531	1254	1426	1426	1425	1425	1471	1229	1370	1370	1369	1369	1405	1202
44000	75	1298	1175	1415	887	1528	561	1244	1147	1357	863	1465	539	1185	1117	1293	838	1396	515
	80	1350	1350	1420	1110	1533	812	1302	1302	1363	1083	1471	789	1249	1249	1300	1054	1404	765
	85	1419	1419	1423	1348	1534	1038	1370	1370	1367	1321	1473	1013	1315	1315	1304	1292	1407	985
	90	1484	1484	1483	1483	1534	1270	1433	1433	1432	1432	1474	1245	1376	1376	1376	1376	1408	1217
46000	75	1305	1202	1422	904	1535	566	1251	1174	1363	881	1471	543	1191	1143	1299	855	1401	520
	80	1364	1364	1427	1134	1539	826	1315	1315	1369	1107	1477	804	1262	1262	1306	1078	1410	780
	85	1433	1433	1430	1382	1540	1059	1383	1383	1373	1355	1479	1034	1327	1327	1310	1310	1412	1006
	90	1497	1497	1497	1497	1540	1301	1445	1445	1445	1445	1479	1275	1388	1388	1388	1388	1413	1248

CFM	Ent DB (°F)	Ambient Temperature (°F)					
		115					
		Entering Wet Bulb (°F)					
		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC
31000	75	1069	903	1174	694	1275	457
	80	1090	1090	1180	861	1283	641
	85	1151	1151	1186	1033	1288	820
	90	1210	1210	1209	1209	1291	980
35000	75	1090	961	1194	731	1292	467
	80	1128	1128	1200	913	1302	672
	85	1190	1190	1206	1105	1305	858
	90	1249	1249	1249	1249	1309	1045
39000	75	1106	1017	1210	768	1306	477
	80	1159	1159	1217	962	1316	702
	85	1222	1222	1221	1175	1320	902
	90	1281	1281	1281	1281	1322	1109
43000	75	1120	1071	1222	802	1318	487
	80	1186	1186	1230	1011	1328	732
	85	1249	1249	1234	1234	1332	944
	90	1308	1308	1307	1307	1333	1171
44000	75	1123	1085	1225	810	1321	489
	80	1192	1192	1233	1022	1331	739
	85	1255	1255	1236	1236	1334	954
	90	1314	1314	1313	1313	1335	1187
46000	75	1128	1111	1230	828	1325	494
	80	1203	1203	1238	1046	1336	754
	85	1266	1266	1241	1241	1339	975
	90	1325	1325	1324	1324	1339	1217

Table 50. Gross cooling capacities (MBh) — 130 ton air-cooled —standard capacity

CFM	Ent DB (°F)	Ambient Temperature (°F)																	
		85						95						105					
		Entering Wet Bulb (°F)						Entering Wet Bulb (°F)						Entering Wet Bulb (°F)					
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
31000	75	1332	1041	1463	818	1593	574	1278	1012	1406	792	1530	550	1221	981	1343	765	1461	524
	80	1349	1231	1467	997	1597	759	1297	1202	1410	969	1535	735	1241	1171	1347	939	1467	709
	85	1381	1381	1474	1169	1601	941	1335	1335	1417	1141	1532	917	1285	1285	1354	1111	1469	890
	90	1449	1449	1491	1359	1603	1113	1402	1402	1435	1331	1542	1086	1350	1350	1375	1301	1475	1057
35000	75	1362	1102	1493	857	1620	585	1307	1072	1433	831	1555	560	1247	1041	1368	803	1484	534
	80	1385	1319	1497	1051	1624	791	1332	1290	1439	1023	1561	767	1274	1258	1374	992	1491	740
	85	1435	1435	1503	1243	1627	993	1387	1387	1445	1215	1563	966	1333	1333	1380	1184	1495	943
	90	1504	1504	1526	1461	1630	1180	1455	1455	1470	1433	1567	1153	1399	1399	1399	1399	1498	1123
39000	75	1387	1160	1517	894	1642	595	1331	1130	1456	868	1575	570	1269	1098	1389	840	1502	544
	80	1417	1405	1522	1103	1646	822	1358	1358	1461	1074	1581	797	1304	1304	1395	1043	1510	771
	85	1480	1480	1527	1315	1649	1038	1429	1429	1467	1286	1584	1010	1374	1374	1400	1255	1513	981
	90	1549	1549	1549	1549	1652	1245	1497	1497	1497	1497	1587	1217	1440	1440	1439	1439	1516	1187
43000	75	1408	1216	1536	928	1660	605	1350	1186	1473	904	1592	580	1287	1153	1405	876	1517	554
	80	1443	1443	1541	1152	1664	852	1393	1393	1479	1123	1598	827	1337	1337	1412	1092	1525	801
	85	1517	1517	1545	1385	1667	1081	1465	1465	1484	1356	1601	1054	1407	1407	1416	1324	1528	1024
	90	1587	1587	1586	1586	1668	1308	1533	1533	1532	1532	1603	1280	1473	1473	1472	1472	1531	1250
44000	75	1412	1230	1540	937	1664	607	1354	1200	1477	913	1595	583	1291	1167	1409	883	1521	556
	80	1452	1452	1545	1165	1668	859	1400	1400	1483	1136	1601	835	1344	1344	1415	1104	1529	808
	85	1526	1526	1549	1402	1670	1110	1473	1473	1488	1373	1604	1064	1414	1414	1420	1341	1532	1034
	90	1595	1595	1595	1595	1672	1323	1541	1541	1540	1540	1606	1296	1480	1480	1480	1480	1534	1265
46000	75	1421	1257	1548	954	1672	612	1362	1227	1485	928	1602	587	1298	1193	1416	900	1527	561
	80	1468	1468	1553	1189	1676	874	1415	1415	1491	1160	1608	849	1358	1358	1422	1128	1535	823
	85	1542	1542	1557	1436	1678	1135	1488	1488	1495	1407	1611	1086	1428	1428	1427	1375	1538	1055
	90	1611	1611	1611	1611	1679	1354	1556	1556	1555	1555	1612	1326	1494	1494	1494	1494	1540	1296

CFM	Ent DB (°F)	Ambient Temperature (°F)					
		115					
		Entering Wet Bulb (°F)					
		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC
31000	75	1160	949	1275	735	1386	496
	80	1182	1139	1281	907	1393	680
	85	1232	1232	1287	1078	1396	859
	90	1294	1294	1309	1268	1402	1025
35000	75	1184	1008	1298	773	1407	506
	80	1210	1210	1305	959	1415	712
	85	1276	1276	1311	1151	1419	914
	90	1340	1340	1339	1339	1423	1091
39000	75	1204	1064	1317	810	1423	516
	80	1246	1246	1324	1009	1432	742
	85	1313	1313	1329	1221	1436	948
	90	1376	1376	1376	1376	1439	1154
43000	75	1220	1119	1332	844	1437	526
	80	1276	1276	1339	1058	1446	772
	85	1344	1344	1343	1290	1450	991
	90	1407	1407	1407	1407	1452	1217
44000	75	1224	1132	1335	853	1440	528
	80	1283	1283	1342	1070	1449	780
	85	1351	1351	1347	1307	1453	1001
	90	1414	1414	1414	1414	1455	1232
46000	75	1231	1159	1341	870	1446	533
	80	1296	1296	1348	1093	1455	794
	85	1364	1364	1353	1341	1458	1022
	90	1427	1427	1426	1426	1460	1263

Heating Performance

Table 51. Natural gas heating capacities, 20-75 ton

Nom Ton	Gas Heat Mod	Heat Input (MBh)	Heat Output (MBh)	Air Temperature Rise vs Unit CFM								
				CFM								
				4000	5000	6000	6140	6700	7000	8000	9000	10000
20, 24	Low	235	188	43	35	29	28	26	25	22	19	
	High	500	400				60	55	53	46	41	
25, 29	Low	235	188		35	29	28	26	25	22	19	17
	High	500	400				60	55	53	46	41	37
30, 36	Low	350	280			43	42	39	37	32	29	26
	High	500	400					55	53	46	41	37
40, 48	Low	350	280							32	29	26
	High	850	680									
50-55, 59	Low	500	400									37
	High	850	680									
60–89	Low	500	400									
	High	850	680									

Nom Ton	Gas Heat Mod	Heat Input (MBh)	Heat Output (MBh)	Air Temperature Rise vs Unit CFM								
				CFM								
				10450	11000	11400	12000	13500	14000	15000	16000	17200
20, 24	Low	235	188									
	High	500	400									
25, 29	Low	235	188	17	16							
	High	500	400	35	34							
30, 36	Low	350	280	25	23	23	22	19				
	High	500	400	35	34	32	31	27				
40, 48	Low	350	280	25	23	23	22	19	18	17	16	15
	High	850	680	60	57	55	52	46	45	42	39	36
50-55, 59	Low	500	400	35	34	32	31	27	26	25	23	21
	High	850	680			55	52	46	45	42	39	36
60–89	Low	500	400						26	25	23	21
	High	850	680						45	42	39	36

Nom Ton	Gas Heat Mod	Heat Input (MBh)	Heat Output (MBh)	Air Temperature Rise vs Unit CFM				
				CFM				
				18000	20000	22500	25000	27000
20, 24	Low	235	188					
	High	500	400					
25, 29	Low	235	188					
	High	500	400					
30, 36	Low	350	280					
	High	500	400					
40, 48	Low	350	280					
	High	850	680	35				
50-55, 59	Low	500	400	20	18	16		
	High	850	680	35	31	28		
60–89	Low	500	400	20	18	16	15	14
	High	850	680	35	31	28	25	23

Notes:

1. All heaters are 80% efficient.
2. CFM values below the minimum and above the maximum shown in this table are not cULus approved.
3. Air temperature rise at sea level = heat output (Btu) ÷ (CFM x 1.085).

Table 52. Natural gas heating capacities, 90-130 ton

Nom Ton	Gas Heat Module	Heat Input (MBh)	Heat Output (MBh)	Air Temperature Rise vs Unit CFM										
				CFM										
				26000	28000	30000	32000	34000	36000	38000	40000	42000	44000	46000
90-130	High	1000	800	28	26	25	23	22	20	19	18	18	17	16

Notes:

1. All heaters are 80% efficient.
2. CFM values below the minimums and above the maximums shown in this table are not cULus approved.
3. Air Temperature Rise at sea level = Heat Output (Btu) ÷ (CFM x 1.085).

Table 53. Steam heating capacities (Q/ITD)

20 Nominal Ton Unit					25 Nominal Ton Unit					30 Nominal Ton Unit				
Steam Module	Unit Standard Air Volume (CFM)				Steam Module	Unit Standard Air Volume (CFM)				Steam Module	Unit Standard Air Volume (CFM)			
	4000	6000	8000	10000		5000	7500	10000	12500		6000	9000	12000	15000
Low Heat	0.95	1.18	1.37	1.52	Low Heat	1.06	1.33	1.52	1.74	Low Heat	1.18	1.64	1.69	2
High Heat	1.94	2.47	2.95	3.31	High Heat	2.2	2.85	3.31	3.65	High Heat	2.47	3.12	3.59	3.95
40 Nominal Ton Unit					**50/55 Nominal Ton Unit**					**60 Nominal Ton Unit**				
Steam Module	Unit Standard Air Volume (CFM)				Steam Module	Unit Standard Air Volume (CFM)				Steam Module	Unit Standard Air Volume (CFM)			
	8000	12000	16000	20000		10000	15000	20000	25000		12000	18000	24000	30000
Low Heat	1.61	2.01	2.29	2.6	Low Heat	1.82	2.21	2.6	2.85	Low Heat	2.32	2.81	3.33	3.71
High Heat	3.36	4.28	4.93	5.43	High Heat	3.86	4.79	5.43	5.97	High Heat	3.85	4.84	5.62	6.18
70/80 & 75 Nominal Ton Unit					**90, 105, 115, 130 Nominal Ton Unit**									
Steam Module	Unit Standard Air Volume (CFM)				Steam Module	Unit Standard Air Volume (CFM)								
	16000	20000	24000	30000		27000	33000	40000	46000					
Low Heat	2.65	2.98	3.33	3.71	Low Heat	5.17	5.7	6.19	6.53					
High Heat	4.5	5.1	5.62	6.18	High Heat	8.83	8.8	9.04	9.26					

Note: Capacities expressed as MBh (Q) per initial temperature difference (ITD) between the entering air temperature to the steam module and the entering steam temperature. Maximum recommended operating pressure is 35 PSIG.

Table 54. Properties of steam

Steam Pressure (Psig)	2	5	10	15	20	25	30	40	50
Temperature Of Steam (°F)	219	227	239	250	259	267	274	287	298

Table 55. Electric heat air temperature rise — 20-75 ton

kW Input	Total MBh	CFM											
		4000	6000	8000	10000	12000	14000	16000	18000	20000	22000	24000	26000
30	102.4	23.6	15.7	11.8	9.4	7.9	6.7	5.9	5.2	4.7	4.3	3.9	3.6
50	170.6	39.3	26.2	19.7	15.7	13.1	11.2	9.8	8.7	7.9	7.1	6.6	6.0
70	238.8		36.7	27.5	22	18.3	15.7	13.8	12.2	11	10	9.2	8.5
90	307.1		47.2	35.4	28.3	23.6	20.2	17.7	15.7	14.2	12.9	11.8	10.9
110	375.3			43.2	34.6	28.8	24.7	21.6	19.2	17.3	15.7	14.4	13.3
130	443.6				40.9	34.1	29.2	25.6	22.7	20.4	18.6	17	15.7
150	511.8				47.2	39.3	33.7	29.5	26.2	23.6	21.4	19.7	18.1
170	580.1					44.6	38.2	33.4	29.7	26.7	24.3	22.3	20.6
190	648.3					49.8	42.7	37.3	33.2	29.9	27.2	24.9	23

Notes:

1. Maximum permitted air temperature rise; 20-50 tons (cULus - 50°F), 60 - 75 tons (cULus - 43°F).
2. Air temperature rise at sea level = kW x 3413 ÷ (scfm x 1.085)
3. All heaters on units provide 3 increments of capacity.
4. See Electrical Data for electrical sizing information.
5. 200 and 230 volt electric heat rooftops require dual power supplies to the control box. All other rooftops have single power connections.

Table 56. Electric heat air temperature rise — 90 to 130 tons

kW Input	Total MBh	CFM					
		24000	27000	30000	33000	36000	40000
190	648.3	24.9	22.1	19.9	18.1	16.5	15.3

Notes:

1. Air temperature at sea level = kW x 3413 ÷ (scfm x 1.085)
2. Only available in 460/60/3 and 575/60/3 voltages.

Table 57. Electric heat kW ranges

Nominal Tons	Nominal Voltage			
	200	230	460	575
20	30-90	30-110	30-110	30-110
25	30-90	30-110	30-130	30-130
30	30-110	30-110	30-150	30-150
40	50-110	50-110	50-170	50-170
50–55	70-110	70-110	70-190	70-190
60	90-110	90-110	90-190	90-190
70	90-110	90-110	90-190	90-190
75	90-110	90-110	90-190	90-190
90	N/A	N/A	190	190
105	N/A	N/A	190	190
115	N/A	N/A	190	190
130	N/A	N/A	190	190

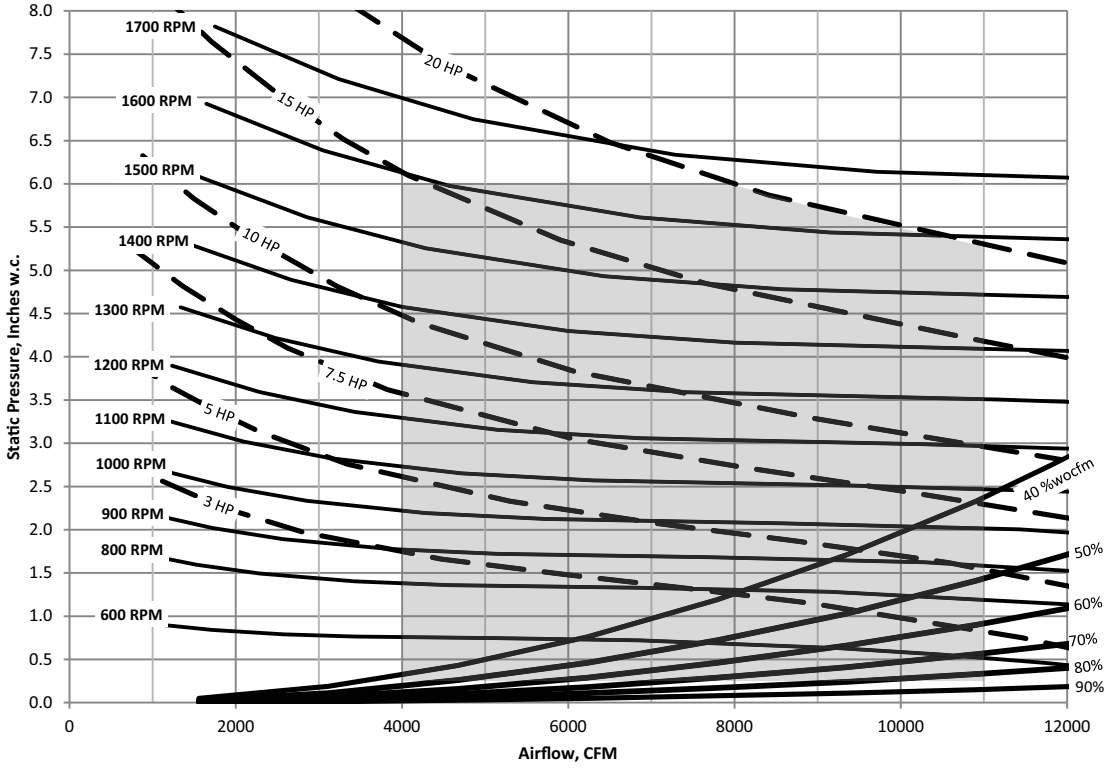
Table 58. Hot water heating capacities (Q/ITD)

20, 25, 30Nominal Tons								
Hot Water Module	Gpm	Water PD (ft)	Unit Standard Air Volume (CFM)					
			4000	6000	8000	10000	12000	14000
Low	10	0.54	1.65	1.99	2.21	2.37	2.48	2.56
High	20	0.91	2.23	2.78	3.16	3.44	3.67	3.85
Low	20	0.91	1.88	2.35	2.69	2.94	3.12	3.27
High	30	1.49	2.36	3	3.46	3.81	4.09	4.31
Low	30	1.49	1.97	2.51	2.9	3.19	3.42	3.6
High	40	2.25	2.43	3.12	3.63	4.02	4.34	4.6
Low	40	2.25	2.02	2.6	3.02	3.34	3.6	3.79
High	50	3.2	2.48	3.2	3.74	4.17	4.51	4.8
Low	60	4.31	2.08	2.69	3.16	3.51	3.79	4.02
High	70	5.65	2.54	3.3	3.88	4.35	4.73	5.04
40, 50 to 55 Nominal Tons								
Hot Water Module	Gpm	Water PD (ft)	Unit Standard Air Volume (CFM)					
			8000	11000	14000	17000	20000	23000
Low	20	0.7	3	3.44	3.75	3.98	4.14	4.29
High	30	1.05	3.85	4.46	4.91	5.26	5.54	5.76
Low	40	1.51	3.4	4	4.43	4.76	5.02	5.21
High	50	2.1	4.2	4.95	5.52	5.97	6.34	6.64
Low	60	2.78	3.56	4.23	4.73	5.11	5.4	5.63
High	75	4.04	4.39	5.24	5.89	6.41	6.85	7.21
Low	80	4.5	3.65	4.36	4.89	5.31	5.63	5.88
High	90	5.54	4.46	5.34	6.03	6.58	7.04	7.42
Low	100	6.66	3.71	4.44	5	5.43	5.77	6.04
High	125	9.99	4.56	5.5	6.23	6.83	7.33	7.75
60, 70, 75 Nominal Tons								
Hot Water Module	Gpm	Water PD (Ft)	Unit Standard Air Volume (CFM)					
			12000	16000	20000	24000	28000	31500
Low	25	0.98	4.28	4.82	5.2	5.48	5.69	5.83
High	30	1.22	5.24	5.91	6.4	6.77	7.06	7.27
Low	50	2.48	4.9	5.63	6.18	6.6	6.92	7.15
High	60	3.33	6.01	6.94	7.66	8.22	8.69	9.03
Low	75	4.83	5.14	5.97	6.6	7.09	7.46	7.73
High	90	6.65	6.32	7.38	8.2	8.87	9.42	9.83
Low	100	8	5.28	6.16	6.84	7.36	7.78	8.07
High	120	11.15	6.49	7.62	8.51	9.23	9.84	10.3
Low	125	11.99	5.37	6.29	6.99	7.54	7.98	8.29
High	150	16.8	6.6	7.77	8.71	9.47	10.11	10.6
90, 105, 115, 130 Nominal Tons								
Hot Water Module	Gpm	Water PD (Ft)	Unit Standard Air Volume (CFM)					
			27000	30000	33000	36000	39000	42000
Low	30	0.77	6.68	6.87	7.04	7.18	7.3	7.41
High	40	1.02	8.51	8.8	9.04	9.26	9.45	9.62
Low	60	1.69	8.07	8.38	8.64	8.87	9.07	9.25
High	80	2.6	10.21	10.64	11.03	11.38	11.69	11.98
Low	100	3.71	8.82	9.19	9.52	9.8	10.05	10.26
High	120	5.07	10.95	11.46	11.92	12.33	12.71	13.05
Low	140	6.59	9.19	9.6	9.96	10.27	10.55	10.79
High	160	8.37	11.37	11.93	12.43	12.88	13.3	13.67
Low	175	9.8	9.39	9.82	10.2	10.53	10.82	11.07
High	200	12.52	11.64	12.23	12.76	13.24	13.68	14.08

Note: Capacities expressed as MBh per initial temperature difference (ITD) between the entering air temperature to the hot water coil and the entering water temperature. Ethylene glycol or other capacities can be determined from the Trane® heating coil computer program. Capacity and pressure drop of ethylene glycol vary greatly with temperature and concentration.

Supply Fan Performance

Figure 15. Supply fan performance with or without variable frequency drive - 20 and 25 ton air-cooled - forward curved

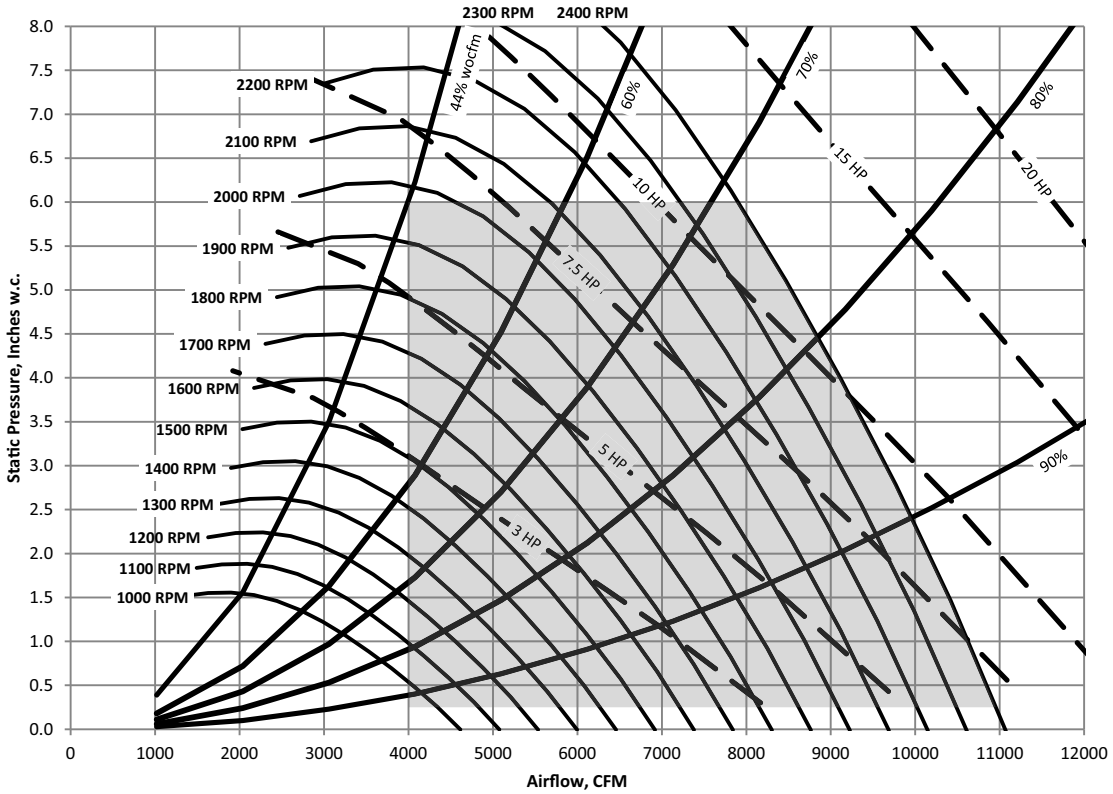


Important: *Maximum static pressure leaving the rooftop is 4.0" H_2O positive. The static pressure drops from the supply fan to the space cannot exceed 4.0" H_2O.*

Notes:

- *Fan performance for 20 and 25 ton rooftops is identical. Contact your local Trane® representative for information on oversized motors.*
- *Shaded areas represent selectable area. Contact your local Trane® representative for more information.*
- *Supply fan performance curve includes internal resistance of rooftop. For total static pressure determination, system external static must be added to appropriate component static pressure drops (evaporator coil, filters, optional economizer, optional exhaust fan, optional heating system, optional cooling only extended casing, optional roof curb).*
- *Maximum Cfm (for cULus approval) as follows: 20 ton - 9,000 Cfm, 25 ton - 11,000 Cfm.*
- *Minimum motor horsepower is 3 hp. Maximum motor horsepower is 20 hp. Maximum fan RPM is 1750.*

Figure 16. Supply fan performance with variable frequency drive - 20 and 25 ton air-cooled - direct drive plenum, 80% width

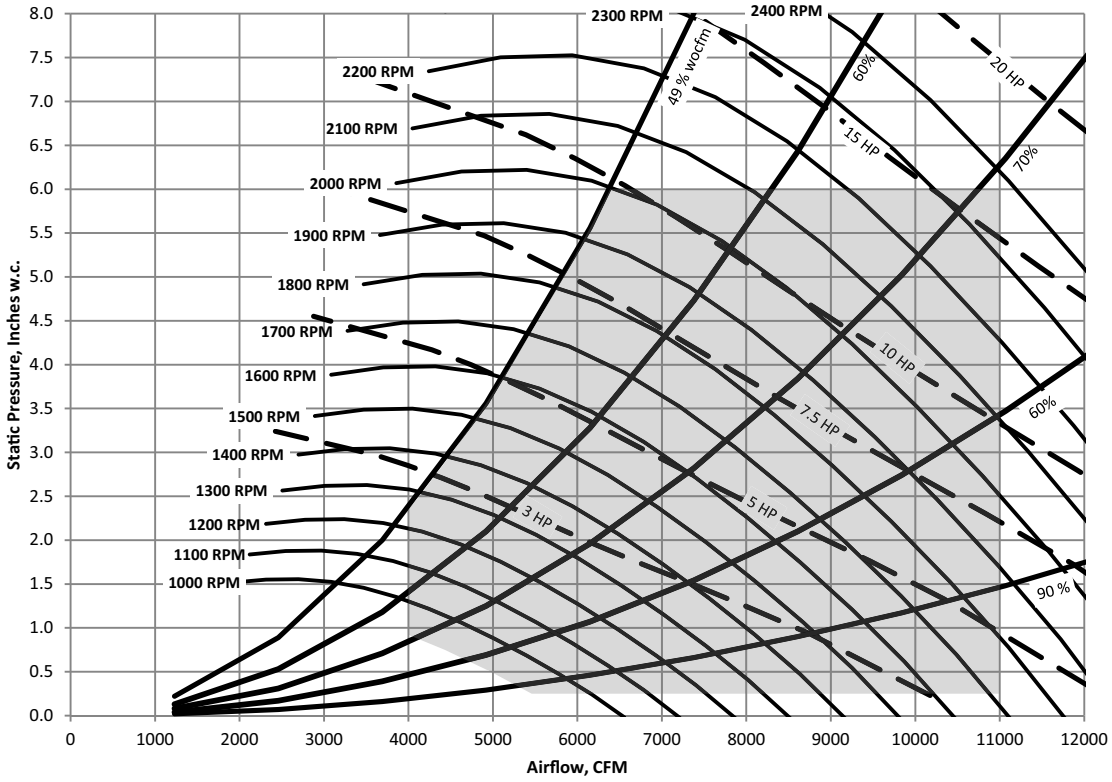


Important: *Maximum static pressure leaving the rooftop is 4.0" H_2O positive. The static pressure drops from the supply fan to the space cannot exceed 4.0" H_2O.*

Notes:

- *Shaded areas represent selectable area. Contact your local Trane® representative for more information.*
- *Supply fan performance curve includes internal resistance of rooftop. For total static pressure determination, system external static must be added to appropriate component static pressure drops (evaporator coil, filters, optional economizer, optional exhaust fan, optional heating system, optional cooling only extended casing, optional roof curb).*
- *Maximum Cfm (for cULus approval) as follows: 20 ton - 9,000 Cfm, 25 ton - 11,000 Cfm.*
- *Minimum motor horsepower is 3 hp. Maximum motor horsepower is 20 hp. Maximum fan RPM is 2400.*

Figure 17. Supply fan performance with variable frequency drive - 20 and 25 ton air-cooled - direct drive plenum, 120% width

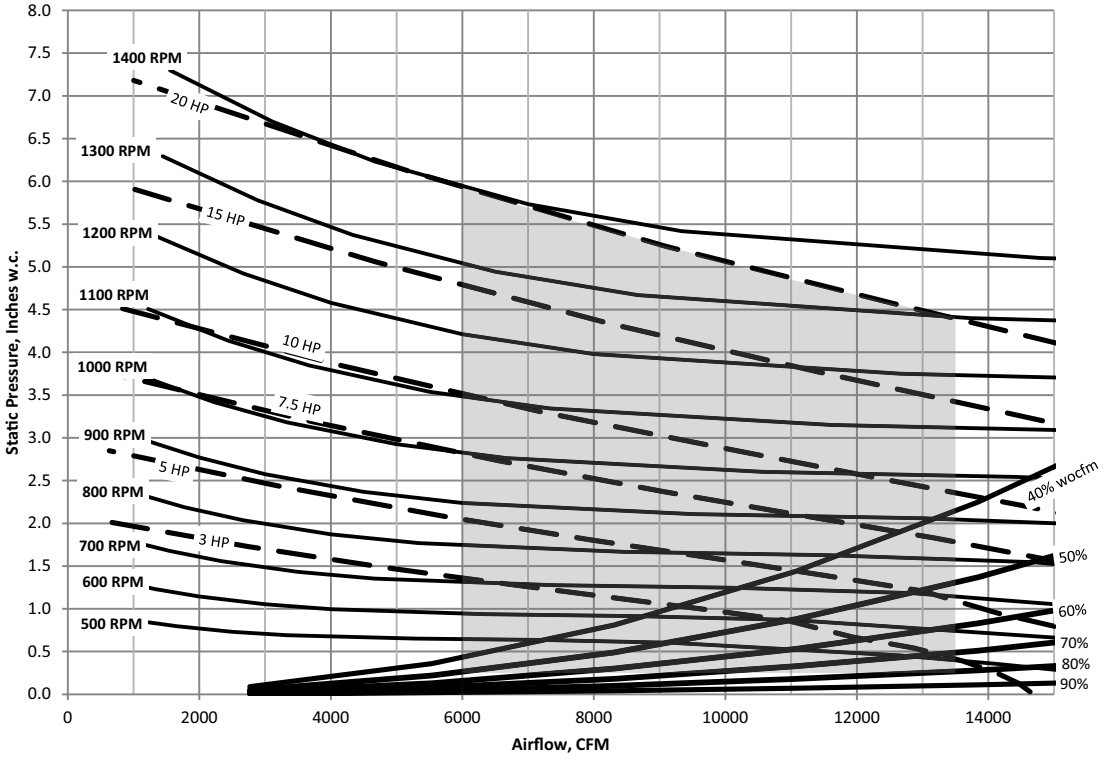


Important: *Maximum static pressure leaving the rooftop is 4.0" H_2O positive. The static pressure drops from the supply fan to the space cannot exceed 4.0" H_2O.*

Notes:

- *Shaded areas represent selectable area. Contact your local Trane® representative for more information.*
- *Supply fan performance curve includes internal resistance of rooftop. For total static pressure determination, system external static must be added to appropriate component static pressure drops (evaporator coil, filters, optional economizer, optional exhaust fan, optional heating system, optional cooling only extended casing, optional roof curb).*
- *Maximum Cfm (for cULus approval) as follows: 20 ton - 9,000 Cfm, 25 ton - 11,000 Cfm.*
- *Minimum motor horsepower is 3 hp. Maximum motor horsepower is 20 hp. Maximum fan RPM is 2400.*

Figure 18. Supply fan performance with or without variable frequency drive — 30 ton air-cooled - forward curved

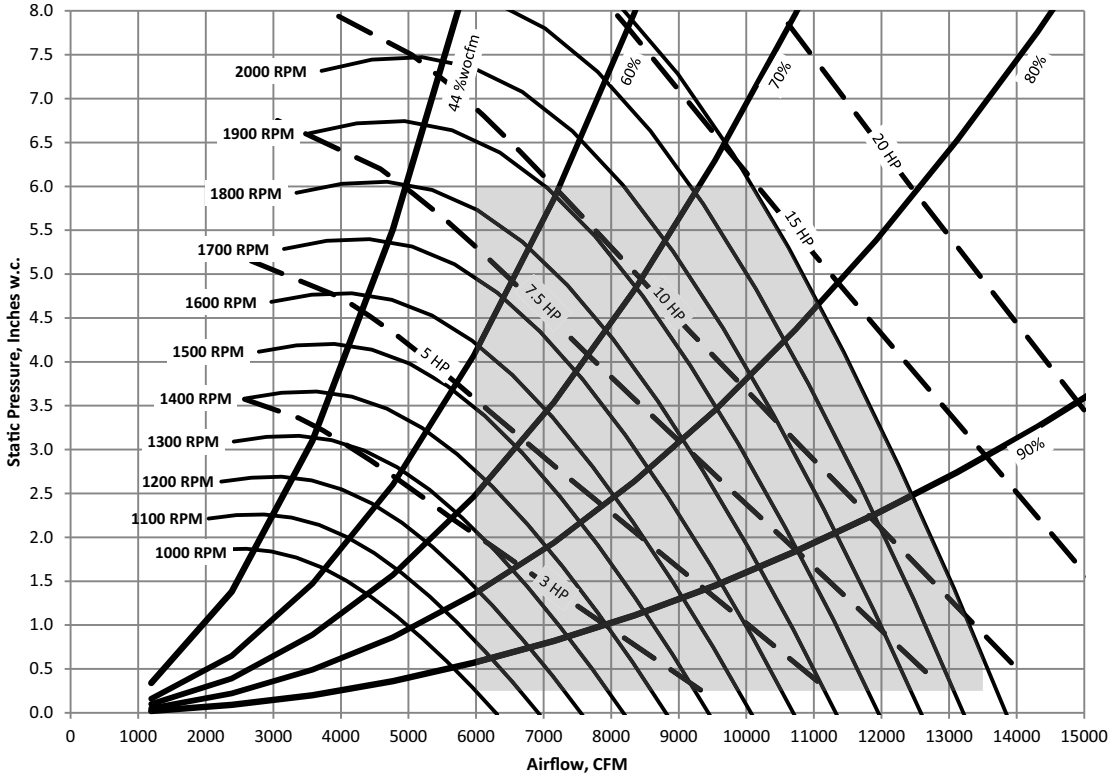


Important: *Maximum static pressure leaving the rooftop is 4.0" H_2O positive. The static pressure drops from the supply fan to the space cannot exceed 4.0" H_2O.*

Notes:

- *Shaded areas represent selectable area. Contact your local Trane® representative for more information.*
- *Supply fan performance curve includes internal resistance of rooftop. For total static pressure determination, system external static must be added to appropriate component static pressure drops (evaporator coil, filters, optional economizer, optional exhaust fan, optional heating system, optional cooling only extended casing, optional roof curb).*
- *Maximum Cfm (for cULus approval) as follows: 30 ton - 13,500 Cfm.*
- *Minimum motor horsepower is 5 hp. Maximum motor horsepower is 20 hp. Maximum fan RPM is 1450.*

Figure 19. Supply fan performance with variable frequency drive — 30 ton air-cooled - direct drive plenum, 80% width

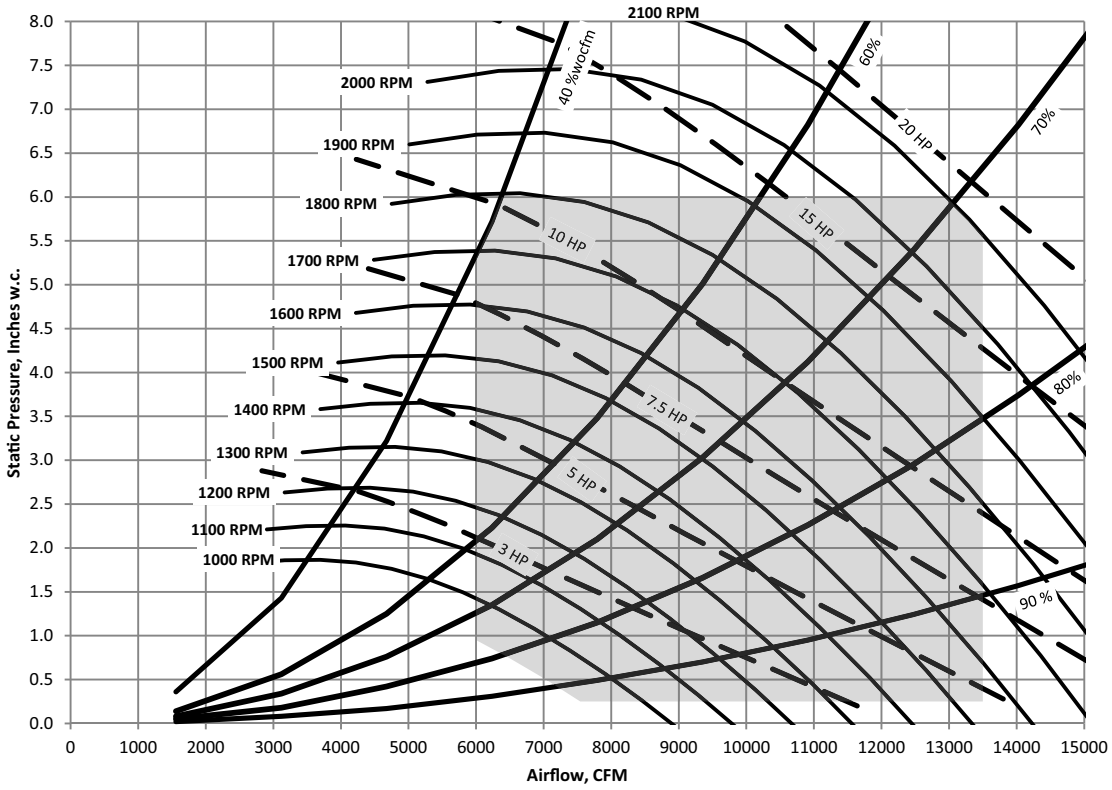


Important: *Maximum static pressure leaving the rooftop is 4.0" H_2O positive. The static pressure drops from the supply fan to the space cannot exceed 4.0" H_2O.*

Notes:

- *Shaded areas represent selectable area. Contact your local Trane® representative for more information.*
- *Supply fan performance curve includes internal resistance of rooftop. For total static pressure determination, system external static must be added to appropriate component static pressure drops (evaporator coil, filters, optional economizer, optional exhaust fan, optional heating system, optional cooling only extended casing, optional roof curb).*
- *Maximum Cfm (for cULus approval) as follows: 30 ton - 13,500 Cfm.*
- *Minimum motor horsepower is 3 hp. Maximum motor horsepower is 20 hp. Maximum fan RPM is 2200.*

Figure 20. Supply fan performance with variable frequency drive — 30 ton air-cooled- direct drive plenum, 120% width

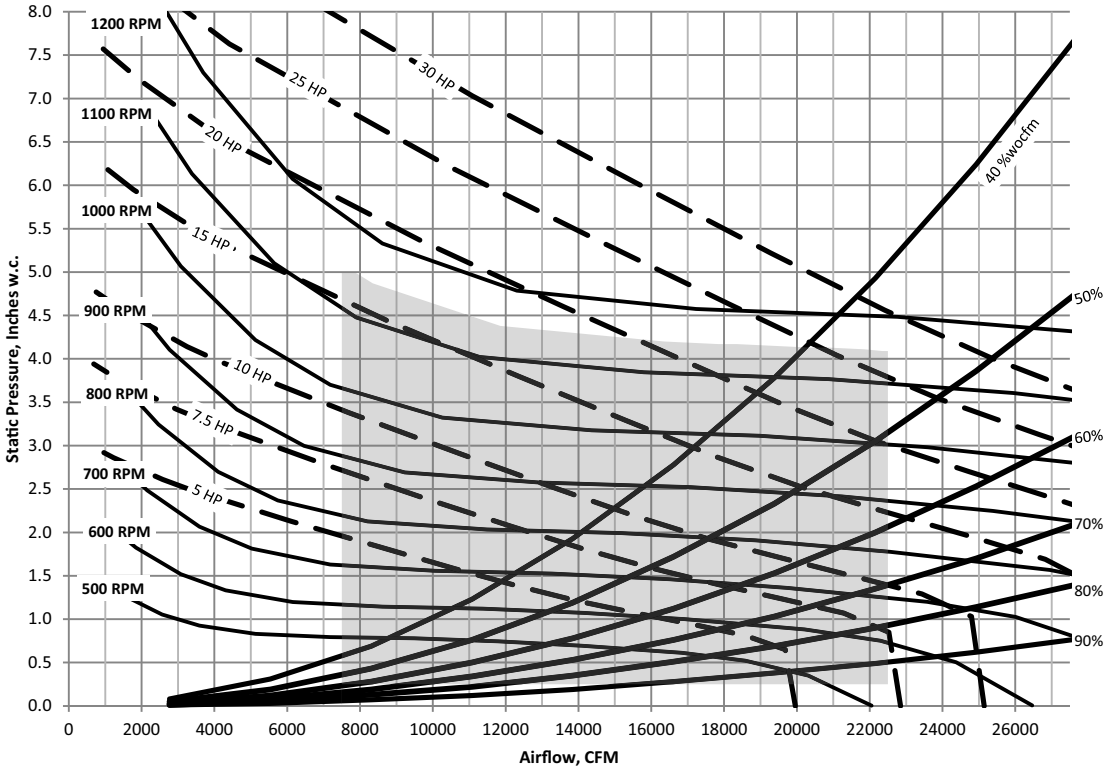


Important: *Maximum static pressure leaving the rooftop is 4.0" H_2O positive. The static pressure drops from the supply fan to the space cannot exceed 4.0" H_2O.*

Notes:

- *Shaded areas represent selectable area. Contact your local Trane® representative for more information.*
- *Supply fan performance curve includes internal resistance of rooftop. For total static pressure determination, system external static must be added to appropriate component static pressure drops (evaporator coil, filters, optional economizer, optional exhaust fan, optional heating system, optional cooling only extended casing, optional roof curb).*
- *Maximum Cfm (for cULus approval) as follows: 30 ton - 13,500 Cfm.*
- *Minimum motor horsepower is 3 hp. Maximum motor horsepower is 20 hp. Maximum fan RPM is 2,100.*

Figure 21. Supply fan performance with or without variable frequency drive - 40, 50 and 55 ton air-cooled - forward curved

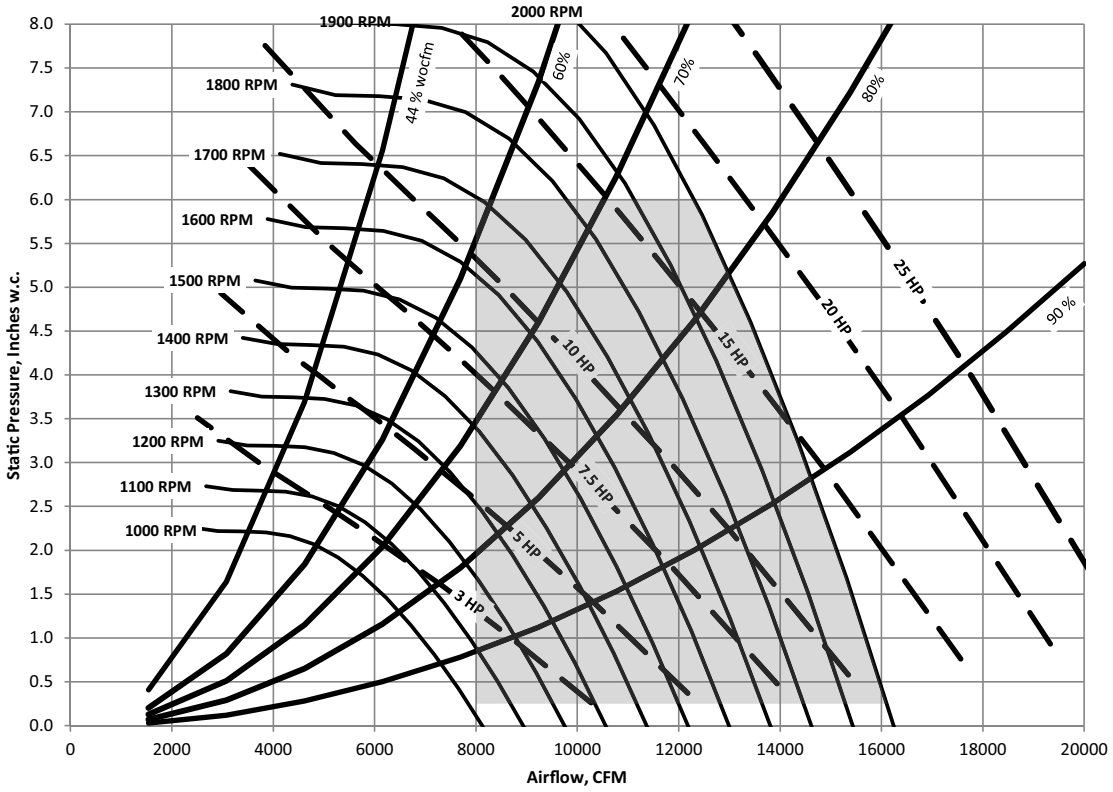


Important: *Maximum static pressure leaving the rooftop is 4.0" H_2O positive. The static pressure drops from the supply fan to the space cannot exceed 4.0" H_2O.*

Notes:

- *Fan performance for 40 and 50 to 55 ton rooftops is identical. Contact your local Trane® representative for information on oversized motors.*
- *Shaded areas represent selectable area. Contact your local Trane® representative for more information.*
- *Supply fan performance curve includes internal resistance of rooftop. For total static pressure determination, system external static must be added to appropriate component static pressure drops (evaporator coil, filters, optional economizer, optional exhaust fan, optional heating system, optional cooling only extended casing, optional roof curb).*
- *Maximum Cfm (for cULus approval) as follows: 40 ton - 18,000 Cfm and 50 ton - 22,500 Cfm.*
- *Minimum motor horsepower is 7.5 hp. Maximum motor horsepower is 30 hp. Maximum ½ hp to 15 hp fan Rpm is 1,141 Rpm, maximum 20 hp to 30 hp fan Rpm is 1,170 Rpm.*

Figure 22. Supply fan performance with variable frequency drive - 40 ton air-cooled - direct drive plenum, 80% width

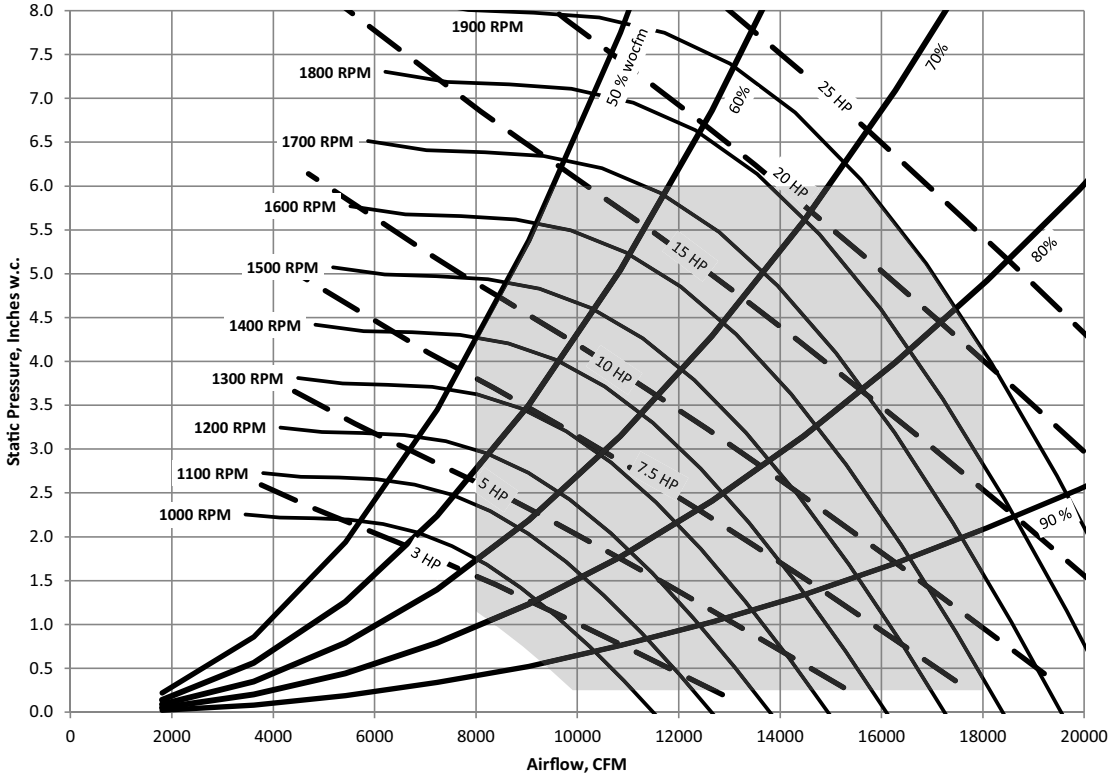


Important: *Maximum static pressure leaving the rooftop is 4.0" H_2O positive. The static pressure drops from the supply fan to the space cannot exceed 4.0" H_2O.*

Notes:

- *Shaded areas represent selectable area. Contact your local Trane® representative for more information.*
- *Supply fan performance curve includes internal resistance of rooftop. For total static pressure determination, system external static must be added to appropriate component static pressure drops (evaporator coil, filters, optional economizer, optional exhaust fan, optional heating system, optional cooling only extended casing, optional roof curb).*
- *Maximum Cfm (for cULus approval) as follows: 40 ton - 18,000 Cfm.*
- *Minimum motor horsepower is 3 hp. Maximum motor horsepower is 25 hp. Maximum fan RPM is 2,000.*

Figure 23. Supply fan performance with variable frequency drive - 40 ton air-cooled - direct drive plenum, 120% width

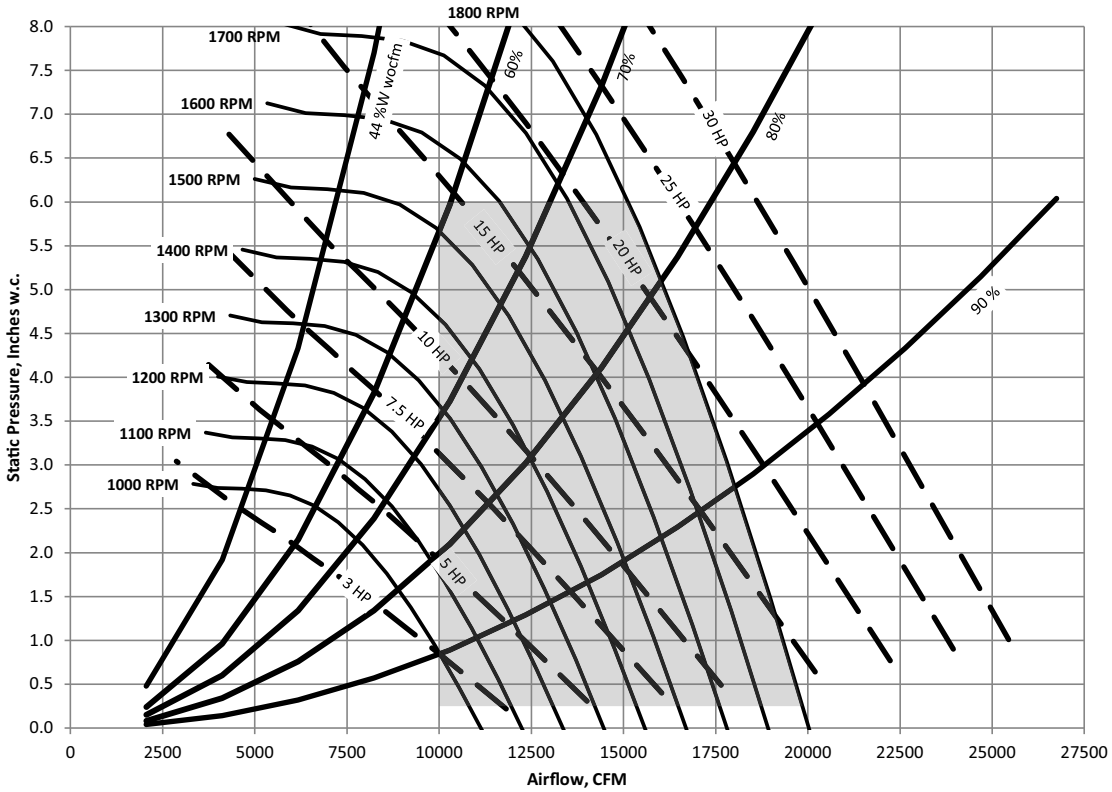


Important: *Maximum static pressure leaving the rooftop is 4.0" H_2O positive. The static pressure drops from the supply fan to the space cannot exceed 4.0" H_2O.*

Notes:

- *Shaded areas represent selectable area. Contact your local Trane® representative for more information.*
- *Supply fan performance curve includes internal resistance of rooftop. For total static pressure determination, system external static must be added to appropriate component static pressure drops (evaporator coil, filters, optional economizer, optional exhaust fan, optional heating system, optional cooling only extended casing, optional roof curb).*
- *Maximum Cfm (for cULus approval) as follows: 40 ton - 18,000 Cfm.*
- *Minimum motor horsepower is 3 hp. Maximum motor horsepower is 25 hp. Maximum fan RPM is 1,900.*

Figure 24. Supply fan performance with variable frequency drive - 50, 55 ton air-cooled- direct drive plenum, 80% width

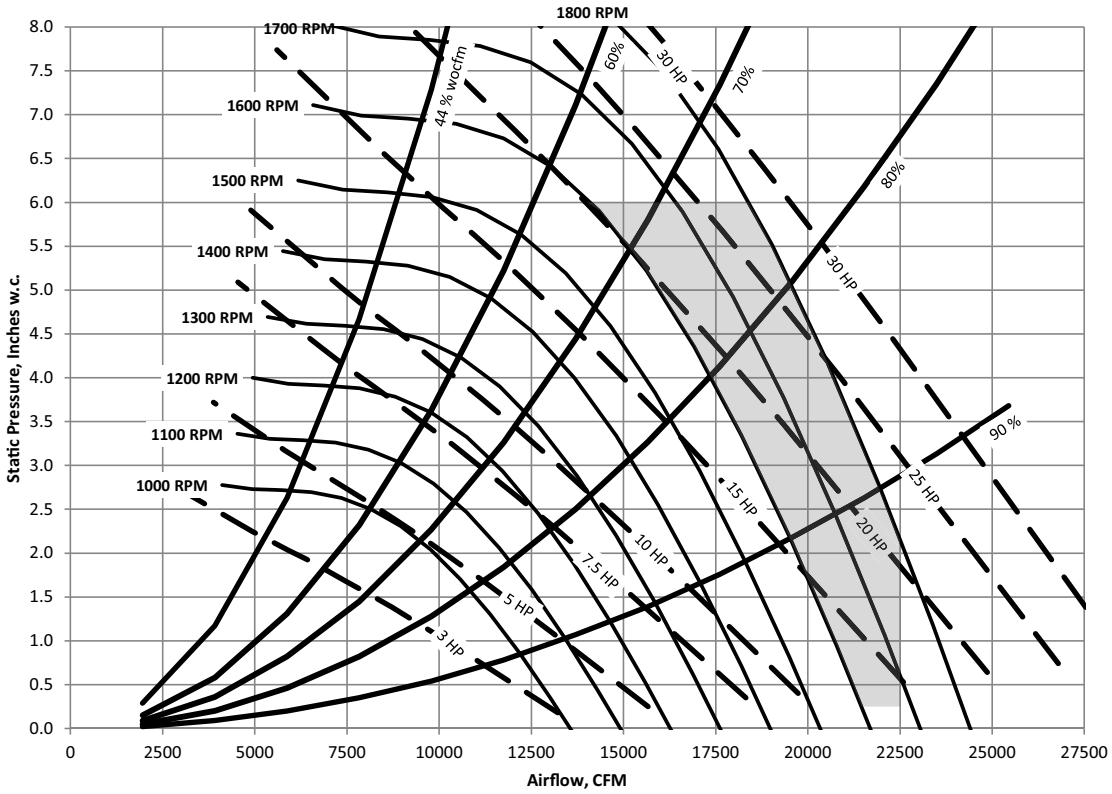


Important: *Maximum static pressure leaving the rooftop is 4.0" H_2O positive. The static pressure drops from the supply fan to the space cannot exceed 4.0" H_2O.*

Notes:

- *Shaded areas represent selectable area. Contact your local Trane® representative for more information.*
- *Supply fan performance curve includes internal resistance of rooftop. For total static pressure determination, system external static must be added to appropriate component static pressure drops (evaporator coil, filters, optional economizer, optional exhaust fan, optional heating system, optional cooling only extended casing, optional roof curb).*
- *Maximum Cfm (for cULus approval) as follows: 50, 55 ton - 22,500 Cfm.*
- *Minimum motor horsepower is 5 hp. Maximum motor horsepower is 30 hp. Maximum fan RPM is 1,800.*

Figure 25. Supply fan performance with variable frequency drive - 50, 55 ton air-cooled - direct drive plenum, 100% width

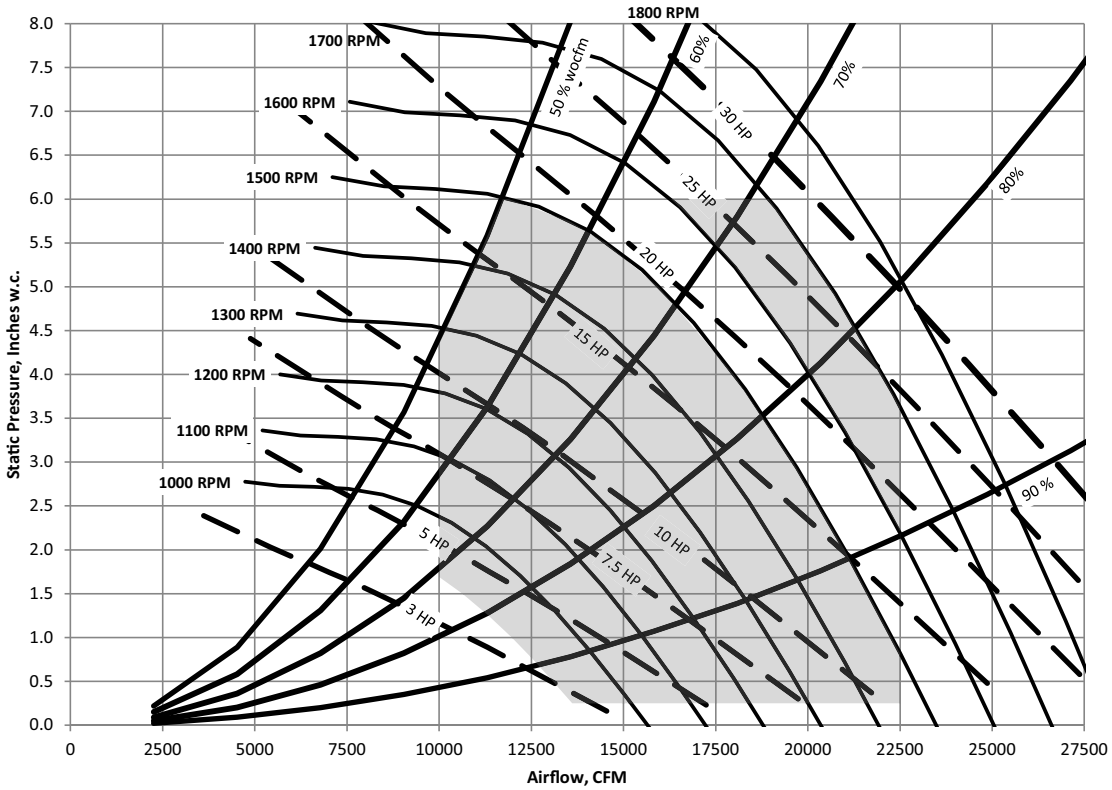


Important: *Maximum static pressure leaving the rooftop is 4.0" H_2O positive. The static pressure drops from the supply fan to the space cannot exceed 4.0" H_2O.*

Notes:

- *Shaded areas represent selectable area. Contact your local Trane® representative for more information.*
- *Supply fan performance curve includes internal resistance of rooftop. For total static pressure determination, system external static must be added to appropriate component static pressure drops (evaporator coil, filters, optional economizer, optional exhaust fan, optional heating system, optional cooling only extended casing, optional roof curb).*
- *Maximum Cfm (for cULus approval) as follows: 50, 55 ton - 22,500 Cfm.*
- *Minimum motor horsepower is 5 hp. Maximum motor horsepower is 30 hp. Maximum fan RPM is 1,800.*

Figure 26. Supply fan performance with variable frequency drive - 50, 55 ton air-cooled - direct drive plenum, 120% width

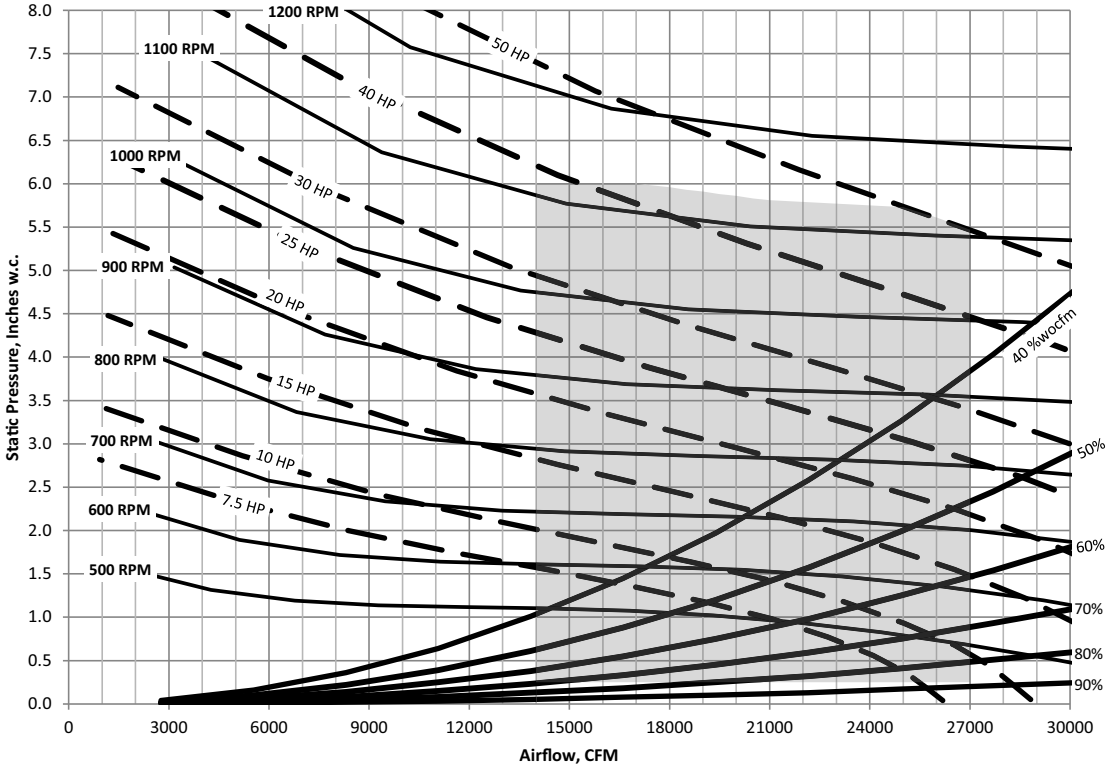


Important: *Maximum static pressure leaving the rooftop is 4.0" H_2O positive. The static pressure drops from the supply fan to the space cannot exceed 4.0" H_2O.*

Notes:

- *Shaded areas represent selectable area. Contact your local Trane® representative for more information.*
- *Supply fan performance curve includes internal resistance of rooftop. For total static pressure determination, system external static must be added to appropriate component static pressure drops (evaporator coil, filters, optional economizer, optional exhaust fan, optional heating system, optional cooling only extended casing, optional roof curb).*
- *Maximum Cfm (for cULus approval) as follows: 50, 55 ton - 22,500 Cfm.*
- *Minimum motor horsepower is 5 hp. Maximum motor horsepower is 30 hp. Maximum fan RPM is 1,700.*

Figure 27. Supply fan performance with or without variable frequency drive - 60, 70 and 75 ton air-cooled - forward curved

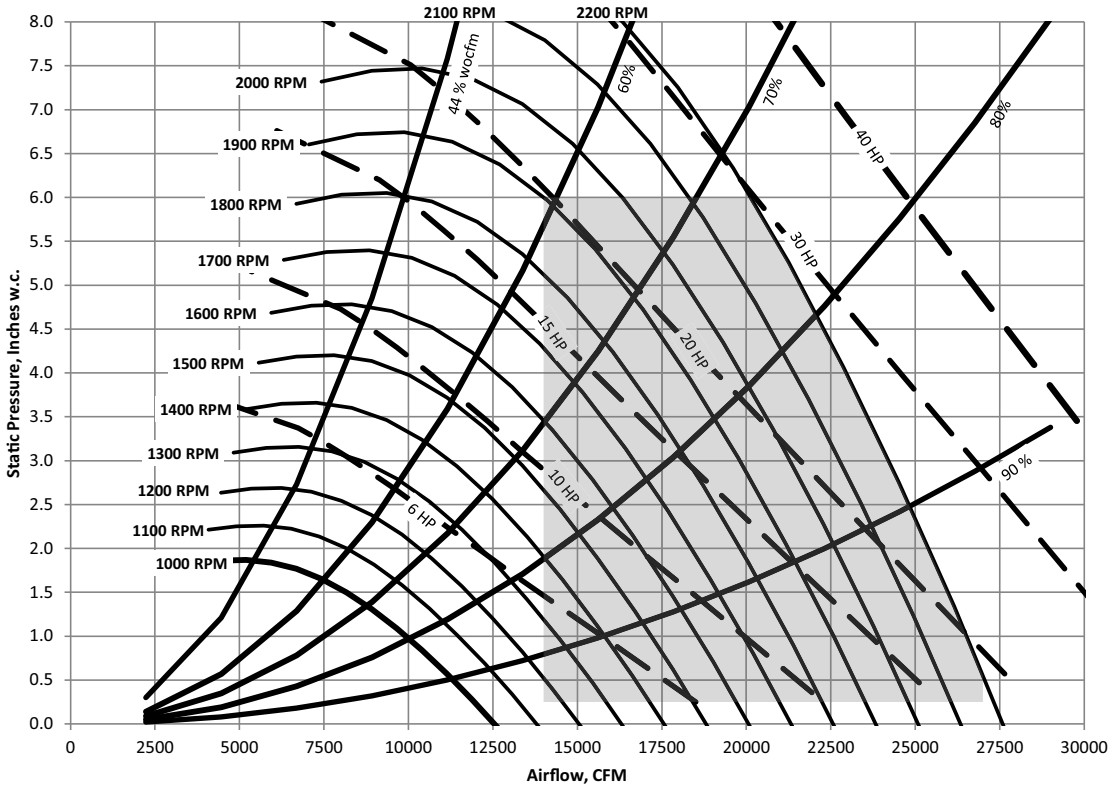


Important: *Maximum static pressure leaving the rooftop is 4.0" H_2O positive. The static pressure drops from the supply fan to the space cannot exceed 4.0" H_2O.*

Notes:

- *Fan performance for 60 and 70 to 75 ton rooftops is identical. Contact your local Trane® representative for information on oversized motors.*
- *Shaded areas represent selectable area. Contact your local Trane® representative for more information.*
- *Supply fan performance curve includes internal resistance of rooftop. For total static pressure determination, system external static must be added to appropriate component static pressure drops (evaporator coil, filters, optional economizer, optional exhaust fan, optional heating system, optional cooling only extended casing, optional roof curb).*
- *Maximum Cfm (for cULus approval) as follows: 60 to 75 ton - 27,000 Cfm and 50 ton - 22,500 Cfm.*
- *Minimum motor horsepower is 10 hp. Maximum motor horsepower is 50 hp. Maximum fan Rpm is 1,130 Rpm. 40 and 50 HP motor available as standard in 460 and 575 volt only*

Figure 28. Supply fan performance with variable frequency drive - 60 ton cooling only air-cooled - direct drive plenum, 80% width

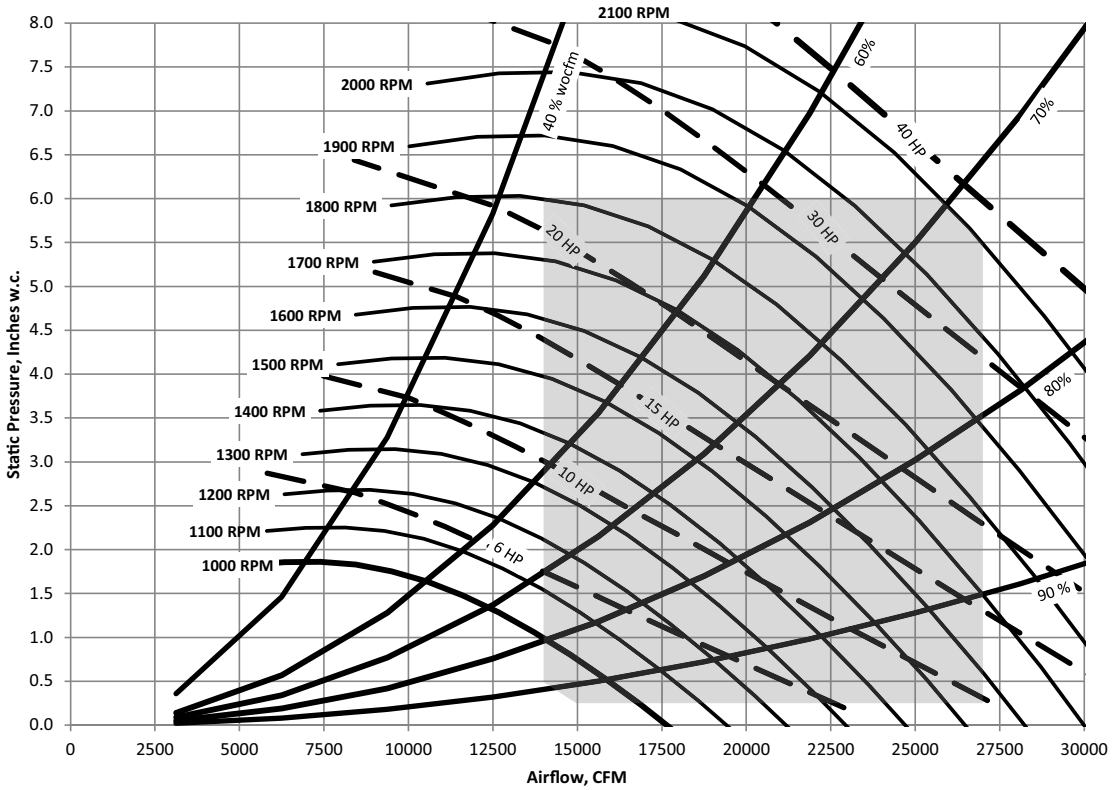


Important: *Maximum static pressure leaving the rooftop is 4.0" H_2O positive. The static pressure drops from the supply fan to the space cannot exceed 4.0" H_2O.*

Notes:

- *Shaded areas represent selectable area. Contact your local Trane® representative for more information.*
- *60 ton units with gas heat use the 27" DDP fans shown for the 70 and 75 ton units. See* *Figure 30, p. 120* *.*
- *Supply fan performance curve includes internal resistance of rooftop. For total static pressure determination, system external static must be added to appropriate component static pressure drops (evaporator coil, filters, optional economizer, optional exhaust fan, optional heating system, optional cooling only extended casing, optional roof curb).*
- *Maximum Cfm (for cULus approval) as follows: 60 ton - 27,000 Cfm.*
- *Minimum motor horsepower is 10 hp (2 x 5 hp motors). Maximum motor horsepower is 40 hp (2 x 20 hp motors). Maximum fan RPM is 2,200.*

Figure 29. Supply fan performance with variable frequency drive - 60 ton cooling only air-cooled - direct drive plenum, 120% width

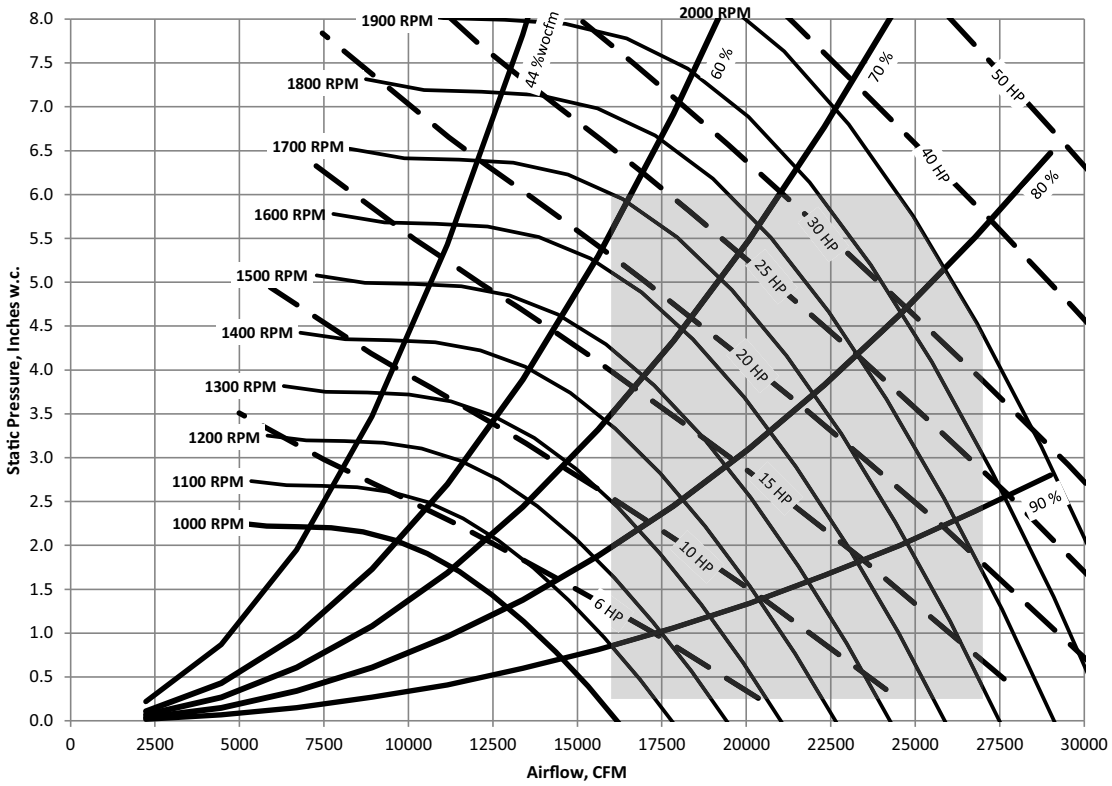


Important: *Maximum static pressure leaving the rooftop is 4.0" H_2O positive. The static pressure drops from the supply fan to the space cannot exceed 4.0" H_2O.*

Notes:

- *Shaded areas represent selectable area. Contact your local Trane® representative for more information.*
- *60 ton units with gas heat use the 27" DDP fans shown for the 70 and 75 ton units. See Figure 30, p. 120.*
- *Supply fan performance curve includes internal resistance of rooftop. For total static pressure determination, system external static must be added to appropriate component static pressure drops (evaporator coil, filters, optional economizer, optional exhaust fan, optional heating system, optional cooling only extended casing, optional roof curb).*
- *Maximum Cfm (for cULus approval) as follows: 60 ton - 27,000 Cfm.*
- *Minimum motor horsepower is 10 hp (2 x 5 hp motors). Maximum motor horsepower is 40 hp (2 x 20 hp motors). Maximum fan RPM is 2,100.*

Figure 30. Supply fan performance with variable frequency drive - 60 ton gas heat, and all 70 and 75 ton air-cooled - direct drive plenum, 80% width

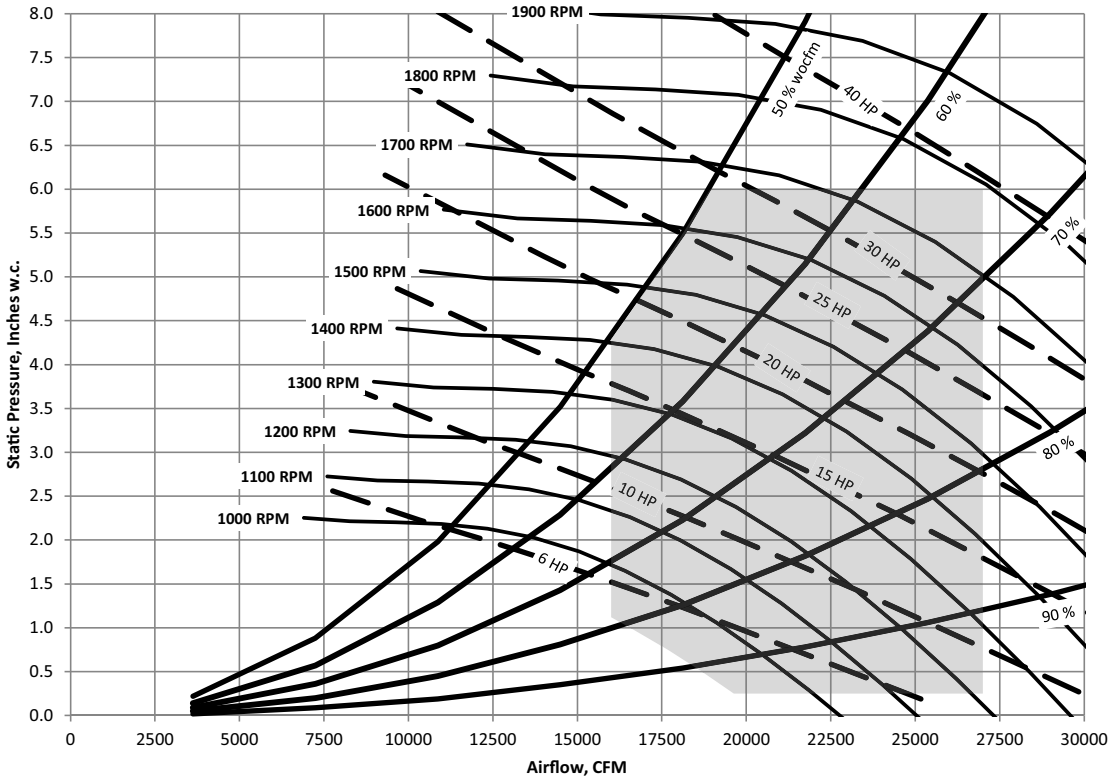


Important: *Maximum static pressure leaving the rooftop is 4.0" H_2O positive. The static pressure drops from the supply fan to the space cannot exceed 4.0" H_2O.*

Notes:

- *Shaded areas represent selectable area. Contact your local Trane® representative for more information.*
- *Supply fan performance curve includes internal resistance of rooftop. For total static pressure determination, system external static must be added to appropriate component static pressure drops (evaporator coil, filters, optional economizer, optional exhaust fan, optional heating system, optional cooling only extended casing, optional roof curb).*
- *Maximum Cfm (for cULus approval) as follows: 60 ton gas heat and 70, 75 ton - 27,000 Cfm.*
- *Minimum motor horsepower is 10 hp (2 x 5 hp motors). Maximum motor horsepower is 50 hp (2 x 25 hp motors). Maximum fan RPM is 2,000.*

Figure 31. Supply fan performance with variable frequency drive - 60 ton gas heat, and all 70 and 75 ton air-cooled-direct drive plenum, 120% width

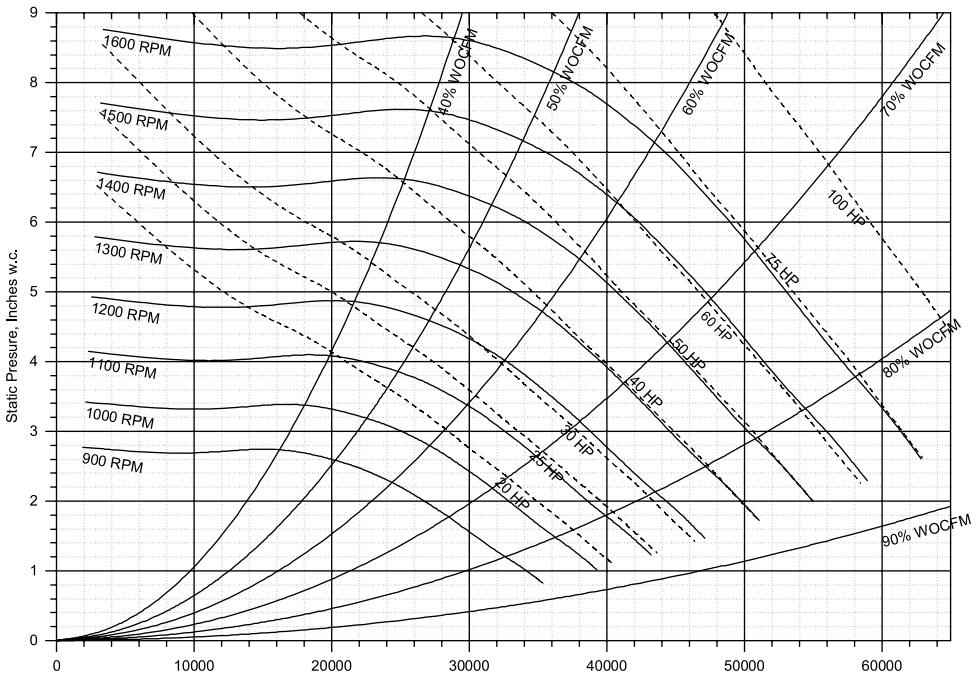


Important: *Maximum static pressure leaving the rooftop is 4.0" H_2O positive. The static pressure drops from the supply fan to the space cannot exceed 4.0" H_2O.*

Notes:

- *Shaded areas represent selectable area. Contact your local Trane® representative for more information.*
- *Supply fan performance curve includes internal resistance of rooftop. For total static pressure determination, system external static must be added to appropriate component static pressure drops (evaporator coil, filters, optional economizer, optional exhaust fan, optional heating system, optional cooling only extended casing, optional roof curb).*
- *Maximum Cfm (for cULus approval) as follows: 60 ton gas heat and 70, 75 ton - 27,000 Cfm.*
- *Minimum motor horsepower is 10 hp (2 x 5 hp motors). Maximum motor horsepower is 50 hp (2 x 25 hp motors). Maximum fan RPM is 1,900.*

Figure 32. Supply fan performance with or without variable frequency drive - 90 ton air-cooled

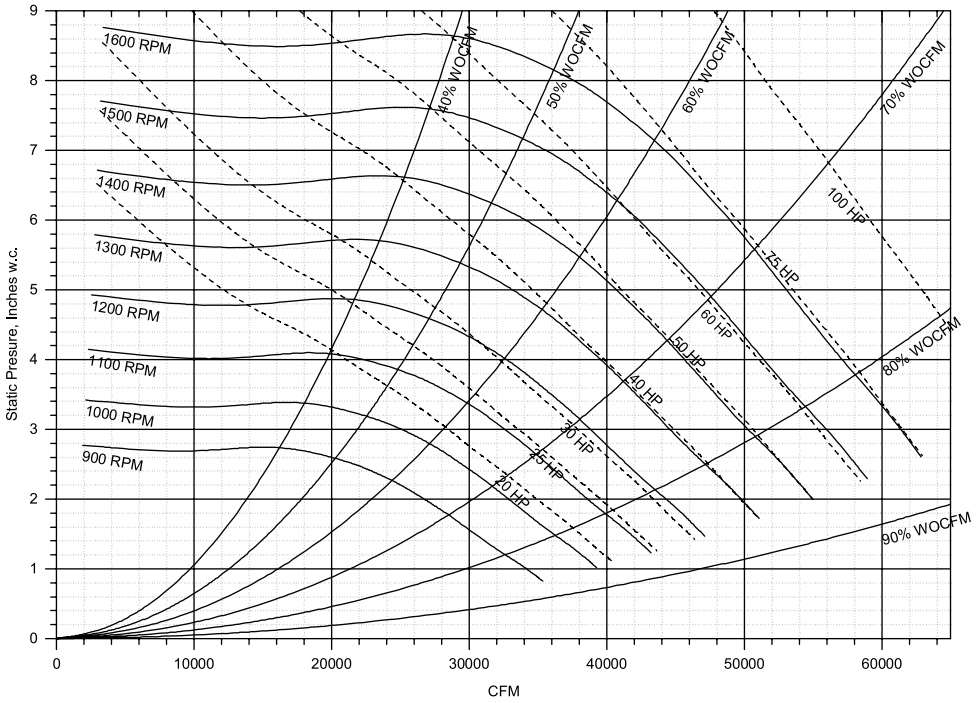


Important: *Maximum static pressure leaving the rooftop is 4.0" H_2O positive. The static pressure drops from the supply fan to the space cannot exceed 4.0" H_2O.*

Notes:

- *Shaded areas represent selectable area. Contact your local Trane® representative for more information.*
- *Supply fan performance curve includes internal resistance of rooftop. For total static pressure determination, system external static must be added to appropriate component static pressure drops (evaporator coil, filters, optional economizer, optional exhaust fan, optional heating system, optional cooling only extended casing, optional roof curb).*
- *Maximum Cfm (for cULus approval) as follows: 90 ton - 46,000 Cfm.*
- *Minimum motor horsepower is 30 hp.*

Figure 33. Supply fan performance with or without variable frequency drive - 105, 115, 130 ton air-cooled



Important: *Maximum static pressure leaving the rooftop is 4.0" H_2O positive. The static pressure drops from the supply fan to the space cannot exceed 4.0" H_2O.*

Notes:

- *Shaded areas represent selectable area. Contact your local Trane® representative for more information.*
- *Supply fan performance curve includes internal resistance of rooftop. For total static pressure determination, system external static must be added to appropriate component static pressure drops (evaporator coil, filters, optional economizer, optional exhaust fan, optional heating system, optional cooling only extended casing, optional roof curb).*
- *Maximum Cfm (for cULus approval) as follows: 105, 115, 130 ton - 46,000 Cfm.*
- *Minimum motor horsepower is 30 hp.*

Component Static Pressure Drops

Table 59. Component static pressure drops (in. W.G.), 20–75 ton air-cooled

		Evap Coil		Heating System									Filters								
				SFHL - FC		SFHL - DDP		SEHL	SLHL		SSHL		Throwaway								
Nom	CFM Std	Dry	Wet	Low	High	Low	High	All kW	Low	High	Low	High	Std	High	Perm Wire	Bag & Pre	Cart & Pre	Final Cart	Std Roof	Econ w/ or w/ out Exh	HGR-H
20	4000	0.12	0.16	0.02	N/A	0.03	N/A	0.02	0.05	0.06	0.02	0.06	0.03	0.03	0.01	0.30	0.24	0.22	0.01	0.03	0.01
	6000	0.24	0.29	0.05	0.05	0.05	0.04	0.04	0.09	0.12	0.05	0.12	0.06	0.06	0.02	0.50	0.44	0.30	0.02	0.06	0.02
	8000	0.37	0.44	0.09	0.09	0.08	0.70	0.70	0.15	0.19	0.10	0.20	0.09	0.09	0.03	0.71	0.68	0.45	0.05	0.12	0.04
	9000	0.45	0.52	0.12	0.12	0.10	0.08	0.09	0.19	0.24	0.12	0.22	0.11	0.11	0.04	0.83	0.81	0.55	0.70	0.15	0.05
25	5000	0.18	0.22	0.03	N/A	0.04	N/A	0.03	0.70	0.09	0.04	0.09	0.05	0.05	0.02	0.40	0.34	0.25	0.01	0.03	0.01
	6000	0.24	0.29	0.05	0.05	0.05	0.04	0.04	0.10	0.12	0.06	0.13	0.70	0.70	0.02	0.50	0.44	0.30	0.02	0.05	0.02
	7500	0.34	0.41	0.08	0.08	0.70	0.06	0.06	0.14	0.17	0.09	0.18	0.09	0.09	0.03	0.66	0.62	0.41	0.04	0.10	0.03
	10000	0.53	0.62	0.14	0.15	0.12	0.09	0.11	0.23	0.28	0.15	0.29	0.13	0.13	0.05	0.95	0.95	0.66	0.10	0.19	0.06
	11000	0.62	0.71	0.17	0.18	0.14	0.10	0.13	0.29	0.33	0.19	0.35	0.15	0.15	0.06	1.06	1.11	0.79	0.12	0.23	0.70
30	6000	0.17	0.24	0.05	0.05	0.03	N/A	0.04	0.09	0.12	0.05	0.12	0.04	0.04	0.01	0.34	0.26	0.24	0.02	0.06	0.02
	9000	0.33	0.45	0.11	0.12	0.05	0.05	0.09	0.19	0.24	0.12	0.22	0.70	0.70	0.02	0.54	0.48	0.36	0.70	0.15	0.04
	12000	0.53	0.67	0.20	0.21	0.70	0.70	0.16	0.31	0.39	0.22	0.41	0.11	0.11	0.04	0.75	0.75	0.58	0.16	0.27	0.70
	14000	0.68	0.83	0.26	0.29	0.09	0.09	0.22	0.40	0.51	0.30	0.50	0.14	0.14	0.06	0.95	0.95	0.76	0.25	0.39	0.09
40	8000	0.19	0.26	0.09	N/A	0.13	n/a	0.70	0.09	0.11	0.05	0.11	0.04	0.04	0.02	0.37	0.31	0.25	0.01	0.03	0.02
	10000	0.27	0.36	0.14	0.11	0.20	0.37	0.11	0.13	0.16	0.08	0.16	0.06	0.06	0.02	0.49	0.43	0.32	0.02	0.03	0.03
	12000	0.36	0.48	0.20	0.15	0.28	0.47	0.16	0.17	0.22	0.11	0.21	0.08	0.08	0.03	0.61	0.56	0.41	0.04	0.70	0.05
	16000	0.57	0.73	0.34	0.26	0.49	0.70	0.29	0.28	0.36	0.20	0.36	0.12	0.12	0.05	0.88	0.87	0.66	0.10	0.09	0.08
	17000	0.62	0.79	N/A	0.29	0.55	0.77	0.32	0.31	0.39	0.22	0.41	0.13	0.13	0.06	0.95	0.95	0.74	0.12	0.11	0.10
	18000	0.68	0.86	N/A	0.33	N/A	0.83	0.36	0.35	0.43	0.25	0.44	0.14	0.14	0.70	1.02	1.04	0.83	0.14	0.13	0.11
50-55	10000	0.20	0.25	0.12	0.10	0.20	N/A	0.11	0.13	0.16	0.70	0.15	0.04	0.04	0.01	0.37	0.30	0.25	0.03	0.05	0.03
	14000	0.34	0.42	0.26	0.20	0.38	0.17	0.22	0.22	0.28	0.15	0.28	0.70	0.70	0.03	0.56	0.50	0.37	0.70	0.08	0.05
	17000	0.46	0.57	0.39	0.29	0.55	0.26	0.32	0.31	0.40	0.22	0.41	0.10	0.10	0.04	0.72	0.68	0.50	0.12	0.11	0.08
	20000	0.59	0.73	0.58	0.41	0.75	0.38	0.44	0.42	0.52	0.30	0.51	0.12	0.12	0.05	0.88	0.88	0.66	0.19	0.17	0.11
	23000	0.74	0.89	0.69	0.54	0.99	0.53	0.58	0.47	0.67	0.41	0.69	0.15	0.15	0.70	1.05	N/A	0.87	0.27	0.22	0.14
60	12000	0.27	0.37	0.10	0.08	0.28	0.14	0.06	0.10	0.13	0.06	0.11	0.05	0.05	0.01	0.44	0.37	0.27	0.02	0.70	0.03
	16000	0.43	0.58	0.18	0.14	0.44	0.28	0.11	0.17	0.21	0.11	0.19	0.70	0.70	0.02	0.63	0.58	0.39	0.05	0.10	0.06
	20000	0.62	0.80	0.27	0.21	0.63	0.46	0.17	0.24	0.31	0.16	0.27	0.10	0.10	0.03	0.84	0.82	0.56	0.10	0.16	0.09
	24000	0.83	1.03	0.40	0.30	0.86	0.68	0.24	0.33	0.42	0.22	0.39	0.11	0.11	0.04	1.06	1.08	0.78	0.16	0.23	0.13
	27000	1.00	1.22	0.46	0.32	1.05	0.88	0.30	0.41	0.52	0.30	0.47	0.16	0.16	0.06	1.18	1.24	0.98	0.27	0.28	0.16
70-75	16000	0.44	0.58	0.18	0.14	0.44	0.28	0.11	0.17	0.21	0.11	0.19	0.70	0.70	0.02	0.63	0.58	0.39	0.05	0.10	0.06
	20000	0.62	0.82	0.27	0.21	0.63	0.46	0.17	0.24	0.31	0.16	0.27	0.10	0.10	0.03	0.84	0.82	0.56	0.10	0.16	0.09
	22000	0.73	0.94	0.33	0.25	0.74	0.56	0.20	0.29	0.37	0.19	0.33	0.12	0.12	0.04	0.95	0.95	0.66	0.13	0.20	0.11
	24000	0.84	1.07	0.40	0.30	0.86	0.68	0.24	0.33	0.42	0.22	0.39	0.14	0.14	0.04	1.06	1.08	0.78	0.16	0.23	0.13
	26000	0.95	1.20	0.47	0.32	0.98	0.81	0.28	0.39	0.49	0.27	0.45	0.16	0.16	0.05	1.17	1.23	0.91	0.23	0.26	0.15
	27000	1.01	1.26	0.51	0.33	1.05	0.88	0.30	0.42	0.52	0.30	0.48	0.17	0.17	0.06	1.12	1.26	0.98	0.27	0.28	0.16

Notes:

1. Static pressure drops of accessory components must be added to external static pressure to enter fan selection tables.
2. Gas heat section maximum temperature rise of 60° F.
3. Throwaway filter option limited to 300 ft/min face velocity.
4. Bag filter option limited to 740 ft/min face velocity.
5. Horizontal roof curbs assume 0.50" static pressure drop or double the standard roof curb pressure drop, whichever is greater.
6. No additional pressure loss for model SXHL.
7. For final filters w/ prefilters (digit 13 = M, N, P, Q) also add pressure drop for throwaway filter.

Table 60. Component static pressure drops (in. W.G.), 90–130 ton air-cooled

Nom	CFM Std	Evap Coil		High Cap Evap		Heating System							Filters						Std Roof	Econ w/ or w/out Exh
						SFHL		SEHL	SLHL		SSHL		Throwaway		Perm	Bag &	Cart &	Final		
		Dry	Wet	Dry	Wet	Low	High	All kW	Low	High	Low	High	Std	High	Wire	Pre	Pre	Cart		
90	27000	0.40	0.53	0.60	0.80	N/A	0.25	0.13	0.26	0.31	0.22	0.32	0.11	0.13	N/A	0.68	0.65	0.77	N/A	0.20
	32000	0.53	0.70	0.80	1.03	N/A	0.31	0.16	0.35	0.41	0.30	0.43	0.14	0.16	N/A	0.84	0.84	1.07	N/A	0.31
	37000	0.67	0.88	1.01	1.32	N/A	0.39	0.23	0.45	0.52	0.40	0.55	0.17	0.19	N/A	1.02	1.04	1.43	N/A	0.41
	42000	0.83	1.08	1.25	1.62	N/A	0.46	0.29	0.56	0.65	0.50	0.68	0.21	0.22	N/A	1.19	1.06	1.86	N/A	0.52
	45000	0.93	1.20	1.40	1.80	N/A	0.52	0.32	0.63	0.73	0.58	0.76	0.24	0.24	N/A	N/A	N/A	2.14	N/A	0.63
105	31000	N/A	N/A	0.63	0.83	N/A	0.28	0.17	0.33	0.39	0.29	0.40	N/A	0.13	N/A	0.82	0.80	1.00	N/A	0.22
	35000	N/A	N/A	0.77	1.01	N/A	0.36	0.21	0.41	0.48	0.36	0.50	N/A	0.16	N/A	0.96	0.96	1.28	N/A	0.32
	39000	N/A	N/A	0.92	1.20	N/A	0.42	0.26	0.49	0.57	0.44	0.60	N/A	0.19	N/A	1.09	1.12	1.59	N/A	0.44
	43000	N/A	N/A	1.08	1.40	N/A	0.45	0.30	0.57	0.66	0.53	0.71	N/A	0.22	N/A	1.22	1.30	1.95	N/A	0.54
	46000	N/A	N/A	1.21	1.56	N/A	0.55	0.34	0.65	0.75	0.61	0.79	N/A	0.24	N/A	N/A	N/A	2.24	N/A	0.64
115/ 130	31000	0.76	1.00	N/A	N/A	N/A	0.28	0.17	0.33	0.39	0.29	0.40	N/A	0.13	N/A	0.82	0.80	1.00	N/A	0.22
	35000	0.92	1.21	N/A	N/A	N/A	0.36	0.21	0.41	0.48	0.36	0.50	N/A	0.16	N/A	0.96	0.96	1.28	N/A	0.32
	39000	1.10	1.44	N/A	N/A	N/A	0.42	0.26	0.49	0.57	0.44	0.60	N/A	0.19	N/A	1.09	1.12	1.59	N/A	0.44
	43000	1.30	1.68	N/A	N/A	N/A	0.45	0.30	0.57	0.66	0.53	0.71	N/A	0.22	N/A	1.22	1.30	1.95	N/A	0.54
	46000	1.45	1.86	N/A	N/A	N/A	0.55	0.34	0.65	0.75	0.61	0.79	N/A	0.24	N/A	N/A	N/A	2.24	N/A	0.64

Notes:

1. Static pressure drops of accessory components must be added to external static pressure to enter fan selection tables.
2. Gas heat section maximum temperature rise of 60° F.
3. Throwaway filter option limited to 300 ft/min face velocity.
4. Bag filter option limited to 740 ft/min face velocity.
5. Horizontal roof curbs assume 0.50" static pressure drop or double the standard roof curb pressure drop, whichever is greater.
6. No additional pressure loss for model SXHK.
7. For final filters w/ prefilters (digit 13 = M, N, P, Q) also add pressure drop for throwaway filter.

Table 61. Component static pressure drops (in. W.G.)—exhaust damper for return fan

Nom Tons	Cfm	Exhaust Damper for Return Fan	Nom Tons	Cfm	Exhaust Damper for Return Fan
20	4000	0.08	50-55	10000	0.28
	6000	0.19		14000	0.56
	8000	0.35		17000	0.75
	9000	0.44		20000	1.15
	10000	0.55		24000	1.66
	12000	0.79		28000	2.26
25	5000	0.13	60	12000	0.31
	6000	0.19		16000	0.56
	7500	0.30		20000	0.88
	10000	0.55		24000	1.27
	11000	0.67		28000	1.73
	12500	0.85		30000	1.99
	14000	1.08	70-75	12000	0.31
30	6000	0.19		16000	0.56
	9000	0.44		20000	0.88
	12000	0.79		22000	1.05
	14000	1.08		24000	1.27
	15000	1.20		26000	1.47
	17000	1.60		28000	1.73
40	8000	0.18		31000	N/A
	10000	0.28		33000	N/A
	12000	0.41			
	16000	0.73			
	17000	0.82			
	20000	1.15			
	22000	1.39			

Fan Drive Selections

Supply Fan Performance

Table 62. FC supply air fan drive selections — 20 – 75 ton

Nom Tons	3 Hp		5 Hp		7.5 Hp		10 Hp		15 Hp		20 Hp		25 Hp		30 Hp		40 Hp		50 Hp	
	RPM	Drive No	RPM	Drive No	RPM	Drive No	RPM	Drive No	RPM	Drive No	RPM	Drive No	RPM	Drive No	RPM	Drive No	RPM	Drive No	RPM	Drive No
20	500	5	700	7	900	9	1100	B	1200	C	1400	E								
	600	6	800	8	1000	A	1200	C	1300	D	1500	F								
	700	7	900	9	1100	B	1300	D	1400	E	1600	G								
	800	8	1000	A	1200	C	1400	E	1500	F	1700	H								
	900	9	1100	B	1300	D			1600	G										
25	500	5	700	7	800	8	1000	A	1200	C	1400	E								
	600	6	800	8	900	9	1100	B	1300	D	1500	F								
	700	7	900	9	1000	A	1200	C	1400	E	1600	G								
	800	8	1000	A	1100	B	1300	D	1500	F	1700	H								
	900	9	1100	B	1200	C	1400	E	1600	G										
					1300	D														
30			600	6	700	7	800	8	900	9	1100	B								
			700	7	800	8	900	9	1000	A	1200	C								
			800	8	900	9	1000	A	1100	B	1300	D								
			900	9	1000	A	1100	B	1200	C	1400	E								
									1300	D										
40					500	5	700	7	800	8	900	9	1000	A	1000	A				
					600	6	800	8	900	9	1000	A	1100	B	1100	B				
					700	7	900	9	1000	A	1100	B								
					800	8														
50-55					500	5	600	6	700	7	800	8	900	9	1000	A				
					600	6	700	7	800	8	900	9	1000	A	1100	B				
					700	7	800	8	900	9	1000	A	1100	B						
					800	8	900	9	1000	A	1100	B								

Table 62. FC supply air fan drive selections — 20 – 75 ton (continued)

Nom Tons	3 Hp		5 Hp		7.5 Hp		10 Hp		15 Hp		20 Hp		25 Hp		30 Hp		40 Hp		50 Hp	
	RPM	Drive No	RPM	Drive No	RPM	Drive No	RPM	Drive No	RPM	Drive No	RPM	Drive No	RPM	Drive No	RPM	Drive No	RPM	Drive No	RPM	Drive No
60, 70, 75							400	4	500	5	600	6	700	7	800	8	900	9	1000	A
							500	5	600	6	700	7	800	8	900	9	1000	A	1100	B
							600	6	700	7	800	8	900	9	1000	A	1100	B		
							700	7	800	8	900	9	1000	A						

Table 63. 80%, 100% and 120% wheel width DDP supply air fan speed ranges - 20 – 75 ton

Nom Tons	DDP Fan Wheel Width	Speed Range (RPM)									
		3 HP	5 HP	7.5 HP	10 HP	15 HP	20 HP	25 HP	30 HP	40 HP	50 HP
20 & 25	80%	1000-1500	1000-1700	1000-2000	1700-2200	1700-2400	1700-2400	N/A	N/A	N/A	N/A
	120%	1000-1300	1000-1500	1000-1800	1000-1900	1700-2200	1700-2400	N/A	N/A	N/A	N/A
30	80%	1000-1200	1000-1500	1000-1700	1000-1900	1700-2100	1700-2200	N/A	N/A	N/A	N/A
	120%	1000-1100	1000-1300	1000-1500	1000-1600	1700-1900	1700-2100	N/A	N/A	N/A	N/A
40	80%	1000	1000-1200	1000-1400	1000-1600	1000-1800	1700-2000	1700-2000	N/A	N/A	N/A
	120%	N/A	1000-1100	1000-1300	1000-1400	1000-1600	1700-1800	1700-1800	N/A	N/A	N/A
50-55	80%	N/A	1000	1000-1200	1000-1300	1000-1500	1700	1700-1800	1700-1800	N/A	N/A
	100%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1700-1800	N/A	N/A
	120%	N/A	N/A	1000	1000-1200	1000-1300	1400-1500	N/A	1700	N/A	N/A
60 Cooling Only	80%	N/A	N/A	N/A	1000-1500	1000-1700	1000-1900	N/A	1700-2100	1700-2200	N/A
	120%	N/A	N/A	N/A	1000-1300	1000-1500	1000-1600	N/A	1700-1900	1700-2100	N/A
60 Gas Heat, All 70 & 75	80%	N/A	N/A	N/A	1000-1200	1000-1400	1000-1600	N/A	1000-1800	1700-2000	1700-2000
	120%	N/A	N/A	N/A	1000-1100	1000-1300	1000-1400	N/A	1000-1600	1700-1800	1700-1900

Note: Some rpms will not allow bypass. Please check TOPSS™ on all applications.

Table 64. Air-cooled supply air fan drive selections — 90 – 130 ton

RPM	15 HP	20 HP	25 HP	30 HP	40 HP
1000	A	A			
1100	B	B	B		
1200	C	C	C	C	
1300		D	D	D	D
1400			E	E	E
1500			F	F	F
1600				G	G

Exhaust Fan Performance

Table 65. Modulating 100% exhaust fan performance — 20 – 75 tons

Nom Tons	CFM Std Air	Negative Static Pressure															
		0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00	
		RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2024	4000	379	0.34	515	0.70	622	1.12	712	1.59	791	2.10	861	2.64				
	6000	421	0.61	541	1.03	643	1.52	732	2.07	811	2.66						
	8000	487	1.10	583	1.56	674	2.11	757	2.72								
	10000	567	1.88	643	2.37	719	2.96										
25	4000	379	0.34	515	0.70	622	1.12	712	1.59	791	2.10	861	2.64	927	3.22	988	3.84
	6000	421	0.61	541	1.03	643	1.52	732	2.07	811	2.66	882	3.28	948	3.94	1010	4.64
	8000	487	1.10	583	1.56	674	2.11	757	2.72	834	3.38	904	4.09	970	4.82		
	10000	567	1.88	643	2.37	719	2.96	794	3.63	864	4.35						
	12000	651	2.98	716	3.56	779	4.18	843	4.88								
30	4000	379	0.34	515	0.70	622	1.12	712	1.59	791	2.10	861	2.64	927	3.22	988	3.84
	6000	421	0.61	541	1.03	643	1.52	732	2.07	811	2.66	882	3.28	948	3.94	1010	4.64
	8000	487	1.10	583	1.56	674	2.11	757	2.72	834	3.38	904	4.09	970	4.82	1030	5.59
	10000	567	1.88	643	2.37	719	2.96	794	3.63	864	4.35	931	5.11	993	5.91	1053	6.77
	12000	651	2.98	716	3.56	779	4.18	843	4.88	905	5.64	967	6.47	1026	7.34		
	14000	736	4.47	796	5.17	850	5.83	904	6.57	960	7.38						

Table 65. Modulating 100% exhaust fan performance — 20 – 75 tons (continued)

Nom Tons	CFM Std Air	Negative Static Pressure															
		0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00	
		RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
40	7500	318	0.67	444	1.21	545	1.85	629	2.54	702	3.27	767	4.02	828	4.83	884	5.66
	9000	331	0.97	444	1.47	543	2.17	628	2.94	702	3.75	770	4.60	831	5.48	887	6.37
	12000	381	2.13	460	2.40	546	3.04	627	3.89	701	4.83	769	5.82	831	6.87	889	7.93
	14000	422	3.40	486	3.49	557	3.98	631	4.76	701	5.72	768	6.78	830	7.90	888	9.07
	16000	468	5.12	520	5.07	579	5.37	643	6.01	707	6.88	769	7.92	829	9.08	887	10.32
50-55	9000	331	0.97	444	1.47	543	2.17	628	2.94	702	3.75	770	4.60	831	5.48	887	6.37
	12000	381	2.13	460	2.40	546	3.04	627	3.89	701	4.83	769	5.82	831	6.87	889	7.93
	15000	445	4.20	502	4.21	567	4.61	636	5.32	704	6.26	769	7.32	830	8.47	888	9.67
	18000	516	7.41	559	7.19	609	7.32	662	7.76	719	8.49	776	9.44	833	10.56	887	11.79
	20000	566	10.31	602	9.91	644	9.88	690	10.15	739	10.69	789	11.48	841	12.48	893	13.68
60, 70, 75	12000	351	1.49	423	2.09	502	3.00	572	4.02	634	5.07	690	6.09	740	7.04	784	7.91
	15000	412	2.68	460	3.15	521	3.96	585	5.02	646	6.24	702	7.53	749	8.83	801	10.14
	18000	478	4.41	516	4.88	557	5.54	607	6.49	662	7.66	715	9.01	766	10.48	814	12.01
	21000	549	6.75	578	7.36	612	7.92	647	8.71	688	9.77	735	11.03	781	12.46	827	14.03
	24000	617	9.83	644	10.59	672	11.22	702	11.88	732	12.77	766	13.89	805	15.22	846	16.72
	27000	688	15.11	711	15.09	736	15.45	761	16.18	788	17.02	815	17.92	844	18.99	876	20.31

Notes:

1. Shaded areas indicate non-standard drive selections. These drive selections must be manually factory selected.

2. Refer to General Data Table for minimum and maximum HP.

Table 66. Air-cooled modulating 100% exhaust fan performance — 90 – 130 ton

Nom Tons	CFM Std Air	Negative Static Pressure																			
		0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00		2.25		2.50	
		RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
90-130	28000	495	12.81	519	13.30	547	13.93	582	15.27	619	17.14	655	18.85	689	20.51	721	22.51	750	24.43	777	26.28
	30000	527	15.67	550	16.22	573	16.71	604	17.84	637	19.53	672	21.63	705	23.38	737	25.16	768	27.31	795	29.37
	32000	559	18.92	581	19.53	602	20.03	628	20.90	658	22.39	690	24.39	723	26.63	753	28.44	784	30.37	811	32.54
	34000	591	22.60	612	23.28	632	23.84	653	24.48	681	25.74	710	27.55	739	29.75	771	32.16	799	34.04	828	36.04
	36000	623	26.73	643	27.47	662	28.09	680	28.62	705	29.66	732	31.25	759	33.29	788	35.76	817	38.26	844	40.23
	38000	656	31.34	675	32.14	693	32.83	710	33.42	730	34.17	755	35.51	780	37.38	806	39.60	834	42.26	861	44.90
	40000	688	36.46	707	37.31	724	38.07	741	38.73	757	39.29	779	40.45	804	42.09	827	44.14	853	46.63	879	49.41

Notes:

1. Shaded areas indicate non-standard drive selections. These drive selections must be manually factory selected.

2. Refer to General Data Table for minimum and maximum HP.

Table 67. 100% Exhaust fan drive selections — 20 – 75 ton

	3 Hp		5 Hp		7.5 Hp		10 Hp		15 Hp		20 Hp	
	RPM	Drive No.	RPM	Drive No.	RPM	Drive No.	RPM	Drive No.	RPM	Drive No.	RPM	Drive No.
20	500 600 700 800 900	5 6 7 8 9										
25	500 600 700 800 900	5 6 7 8 9	700 800 900 1000	7 8 9 A								
30	500 600 700 800 900	5 6 7 8 9	700 800 900 1000	7 8 9 A	800 900 1000 1100	8 9 A B						
40			400 500 600 700 800	4 5 6 7 8	600 700 800	6 7 8	700 800	7 8				
50–55			400 500 600 700 800	4 5 6 7 8	600 700 800	6 7 8	700 800	7 8	700 800 900	7 8 9		
60			400	4	600	6	600	6	700	7	800	8
70			500	5	700	7	700	7	800	8		
75			600	6								

Table 68. 100% Exhaust fan drive selections — 90 – 130 ton

Nom Tons	15 HP		20 HP		25 HP		30 HP		40 HP	
	RPM	Drive No.	RPM	Drive No.	RPM	Drive No.	RPM	Drive No.	RPM	Drive No.
90-130	500 600	5 6	500.00 600.00 700	5 6 7	600.00 700.00 800	6 7 8	600.00 700.00 800	6 7 8	700.00 800.00	7 8

Table 69. 50% Exhaust fan performance — 20 – 75 tons

Nom Tons	CFM Std Air	Negative Static Pressure													
		0.20		0.40		0.60		0.80		1.00		1.20		1.40	
		RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
20, 25	2000	346	0.14	465	0.27	560	0.43	641	0.60	712	0.79	776	1.00	836	1.21
	3000	397	0.27	495	0.42	583	0.61	662	0.81	731	1.03	795	1.27	854	1.51
	4000	469	0.51	546	0.68	621	0.88	691	1.11	757	1.36	818	1.62	876	1.90
	5000	548	0.88	613	1.08	675	1.30	736	1.55	794	1.81	850	2.10	903	2.39
	6000	630	1.40	690	1.66	742	1.90	793	2.16	844	2.45	894	2.75	943	3.06
30	2000	346	0.14	465	0.27	560	0.43	641	0.60	712	0.79	776	1.00	836	1.21
	3000	397	0.27	495	0.42	583	0.61	662	0.81	731	1.03	795	1.27	854	1.51
	4000	469	0.51	546	0.68	621	0.88	691	1.11	757	1.36	818	1.62	876	1.90
	5000	548	0.88	613	1.08	675	1.30	736	1.55	794	1.81	850	2.10	903	2.39
	6000	630	1.40	690	1.66	742	1.90	793	2.16	844	2.45	894	2.75	943	3.06
	7000	714	2.10	769	2.42	818	2.72	862	3.00	906	3.29	950	3.61	993	3.95
40–55	3000	281	0.20	396	0.39	486	0.60	560	0.83	625	1.07	683	1.33	737	1.61
	5000	326	0.55	404	0.73	485	0.99	559	1.29	627	1.61	687	1.94	741	2.28
	7000	411	1.35	459	1.51	513	1.74	571	2.04	629	2.39	686	2.77	740	3.18
	9000	508	2.80	540	2.92	578	3.13	618	3.40	662	3.72	706	4.09	751	4.50
	11000	609	5.05	633	5.16	661	5.34	691	5.58	723	5.87	756	6.21	792	6.59
60, 70, 75	4000	271	0.29	364	0.54	438	0.82	499	1.07	550	1.30	601	1.56	651	1.87
	6000	339	0.71	391	0.90	456	1.22	517	1.60	572	2.01	622	2.43	668	2.85
	8000	425	1.55	460	1.73	497	1.96	542	2.30	591	2.72	639	3.20	684	3.73
	10000	517	2.88	543	3.13	571	3.34	600	3.59	632	3.94	649	4.37	707	4.87
	12000	612	4.84	651	5.15	655	5.43	678	5.68	702	5.95	726	6.29	752	6.71
	13000	659	6.09	679	6.44	699	6.76	720	7.04	741	7.31				

Notes:

1. Shaded areas indicate non-standard drive selections. These drive selections must be manually factory selected.
2. Refer to General Data Table for minimum and maximum HP.

Table 70. 50% Exhaust fan performance — 90 -130 tons

Nom Tons	CFM Std Air	Negative Static Pressure																			
		0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00		2.25		2.50	
		RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
90-130	12000	432	4.09	461	4.31	502	4.86	545	5.67	585	6.35	622	7.19	655	7.99	686	8.78	717	9.57	748	10.48
	14000	495	6.40	519	6.65	547	6.96	582	7.64	619	8.57	655	9.42	689	10.26	721	11.26	750	12.21	777	13.14
	16000	559	9.46	581	9.77	602	10.02	628	10.45	658	11.20	690	12.19	723	13.32	753	14.22	784	15.18	811	16.27
	18000	623	13.36	643	13.73	662	14.05	680	14.31	705	14.83	732	15.63	759	16.65	788	17.88	817	19.13	844	20.12
	20000	688	18.23	707	18.66	724	19.03	741	19.36	757	19.65	779	20.22	804	21.04	827	22.07	853	23.31	879	24.70

Notes:

1. Shaded areas indicate non-standard drive selections. These drive selections must be manually factory selected.

2. Refer to General Data Table for minimum and maximum HP.

Table 71. 50% Exhaust fan drive selections 20 – 75 tons

Nom Tons	3 Hp		5 Hp		7.5 Hp	
	RPM	Drive No.	RPM	Drive No.	RPM	Drive No.
20, 25	500	5				
	600	6				
	700	7				
	800	8				
	900	9				
30	500	5	800	8		
	600	6	900	9		
	700	7	1000	A		
	800	8				
	900	9				
40–55			500	5	600	6
			600	6	700	7
			700	7		
60, 70, 75			400	4	700	7
			500	5		
			600	6		

Table 72. 50% Exhaust fan drive selections, 90 - 130 tons

Nom Tons	15 Hp	
	RPM	Drive No.
90-130	500	5
	600	6
	700	7
	800	8
	900	9

Return Fan Performance

Table 73. Return fan performance—20, 25, 30 ton air-cooled (24.5" Fan)

CFM Std Air	Return Fan Static Pressure Including Exhaust Damper P.D.															
	0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
4000	557	0.29	638	0.48	710	0.68	776	0.89	838	1.10	899	1.32	969	1.60	1038	1.89
4500	605	0.36	682	0.57	749	0.79	811	1.02	869	1.25	926	1.49	980	1.73	1033	1.99
5000	654	0.44	727	0.67	790	0.91	850	1.16	905	1.41	957	1.67	1007	1.93	1057	2.20
5500	704	0.53	773	0.79	834	1.04	889	1.30	943	1.58	992	1.86	1040	2.15	1087	2.44
6000	756	0.64	821	0.92	879	1.20	932	1.47	982	1.77	1030	2.06	1076	2.38	1121	2.70
6500	808	0.76	868	1.06	925	1.36	976	1.66	1024	1.97	1070	2.29	1114	2.61	1157	2.95
7000	861	0.90	917	1.21	972	1.55	1021	1.87	1067	2.19	1112	2.53	1154	2.87	1195	3.22
7500	913	1.06	968	1.39	1019	1.74	1068	2.10	1112	2.44	1155	2.79	1196	3.15	1235	3.51
8000	967	1.24	1019	1.58	1068	1.96	1115	2.34	1158	2.71	1199	3.08	1238	3.45	1277	3.84
8500	1021	1.44	1071	1.80	1116	2.19	1162	2.60	1204	3.00	1244	3.39	1283	3.79	1320	4.19
9000	1075	1.67	1123	2.04	1166	2.45	1210	2.88	1252	3.30	1290	3.72	1327	4.14	1363	4.56
9500	1130	1.92	1175	2.31	1217	2.73	1258	3.17	1299	3.62	1337	4.07	1373	4.52	1408	4.96
10000	1186	2.20	1228	2.60	1269	3.04	1307	3.50	1347	3.97	1384	4.45	1419	4.91	1454	5.38
10500	1241	2.50	1280	2.92	1321	3.37	1357	3.85	1395	4.34	1432	4.85	1466	5.33	1500	5.84
11000	1297	2.84	1334	3.27	1373	3.74	1409	4.23	1443	4.74	1480	5.26	1515	5.79	1546	6.29
11500	1353	3.20	1387	3.64	1425	4.13	1460	4.64	1493	5.16	1528	5.71	1561	6.25	1594	6.79
12000	1408	3.60	1441	4.06	1477	4.56	1512	5.08	1544	5.62	1576	6.18	1610	6.75	1642	7.32
12500	1464	4.03	1496	4.50	1530	5.01	1565	5.56	1596	6.11	1626	6.68	1658	7.28	1689	7.87
13000	1520	4.49	1551	4.98	1583	5.51	1617	6.06	1648	6.64	1677	7.22	1707	7.84	1737	8.44
13500	1576	4.99	1606	5.50	1636	6.03	1669	6.60	1700	7.20	1728	7.80	1756	8.42	1785	9.06

Table 73. Return fan performance—20, 25, 30 ton air-cooled (24.5" Fan) (continued)

CFM Std Air	Return Fan Static Pressure Including Exhaust Damper P.D.															
	0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
14000	1633	5.52	1661	6.05	1690	6.60	1721	7.19	1752	7.79	1780	8.42	1807	9.05	1834	9.70

Notes:
1. Max fan RPM 1715 for 24.5" Class I Fan
2. Max motors available are as follows: 20T: 3HP, 25T; 5HP, 30T: 7.5 HP
3. Max CFM available is as follows; 20T: 9000, 25T: 11000, & 30T: 13500
4. Min CFM is 4000 for 20T, 25T, & 30T
5. Return fan belt drive RPM selections will be available to cover 500-1600 RPM range +/- 50 RPM
6. Performance data includes cabinet and rain hood effect. Damper pressure drop must be added to the return duct static. See Table 59, p. 124 - exhaust damper for return fan in Performance Data.
7. Shaded area indicates nonstandard BHP or RPM selections. Contact a local Trane® representative for more information.

Table 74. Return fan performance—40, 50 and 55 ton air-cooled (27" Fan)

CFM Std Air	Return Fan Static Pressure Including Exhaust Damper P.D.															
	0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
7500	709	0.82	766	1.16	815	1.50	861	1.85	906	2.22	949	2.60	991	2.99	1033	3.39
8000	748	0.95	803	1.31	851	1.67	895	2.04	938	2.43	979	2.82	1018	3.22	1058	3.64
8500	788	1.09	840	1.47	887	1.86	930	2.24	971	2.64	1010	3.05	1049	3.48	1087	3.92
9000	827	1.24	878	1.64	924	2.05	965	2.46	1005	2.88	1043	3.31	1080	3.75	1115	4.19
9500	867	1.41	916	1.83	961	2.27	1001	2.70	1040	3.14	1076	3.58	1112	4.03	1146	4.50
10000	908	1.60	955	2.04	999	2.50	1038	2.95	1075	3.41	1111	3.88	1145	4.34	1179	4.83
10500	948	1.81	994	2.27	1036	2.75	1075	3.23	1111	3.70	1145	4.18	1179	4.68	1212	5.18
11000	989	2.04	1033	2.51	1074	3.01	1112	3.51	1147	4.01	1181	4.51	1213	5.02	1245	5.53
11500	1030	2.28	1072	2.78	1112	3.29	1149	3.82	1184	4.33	1216	4.86	1248	5.38	1279	5.92
12000	1071	2.55	1112	3.06	1151	3.59	1187	4.14	1221	4.69	1253	5.24	1284	5.78	1314	6.33
12500	1112	2.83	1152	3.37	1189	3.92	1225	4.48	1258	5.06	1290	5.62	1320	6.19	1349	6.76
13000	1153	3.14	1192	3.70	1228	4.27	1263	4.86	1296	5.45	1327	6.04	1356	6.63	1385	7.23
13500	1194	3.47	1232	4.05	1267	4.63	1301	5.24	1333	5.85	1364	6.47	1393	7.08	1421	7.70
14000	1236	3.83	1272	4.42	1307	5.03	1340	5.66	1371	6.29	1401	6.94	1430	7.57	1457	8.20
14500	1277	4.21	1313	4.82	1346	5.45	1379	6.10	1410	6.75	1439	7.42	1467	8.08	1494	8.73
15000	1319	4.62	1353	5.25	1386	5.90	1417	6.55	1448	7.23	1477	7.92	1504	8.61	1531	9.29
15500	1361	5.05	1394	5.71	1426	6.37	1457	7.05	1486	7.74	1514	8.44	1542	9.16	1569	9.87
16000	1402	5.51	1435	6.18	1466	6.87	1496	7.57	1525	8.28	1553	9.01	1580	9.74	1606	10.47
16500	1444	6.00	1476	6.69	1506	7.40	1535	8.12	1564	8.85	1591	9.58	1617	10.34	1643	11.10
17000	1486	6.52	1517	7.23	1547	7.96	1575	8.70	1603	9.44	1629	10.20	1655	10.97	1681	11.75
17500	1528	7.07	1558	7.80	1587	8.55	1615	9.30	1642	10.07	1668	10.85	1694	11.64	1718	12.43
18000	1570	7.65	1599	8.40	1627	9.17	1655	9.94	1681	10.73	1707	11.53	1732	12.33	1757	13.15
18500	1612	8.26	1640	9.03	1668	9.81	1695	10.62	1721	11.43	1746	12.23	1771	13.07	1794	13.89
19000	1654	8.91	1682	9.70	1709	10.50	1735	11.31	1760	12.14	1785	12.97	1809	13.82	1833	14.67
19500	1696	9.59	1723	10.40	1749	11.22	1775	12.06	1800	12.90	1825	13.76	1848	14.62	1872	15.50
20000	1738	10.30	1765	11.13	1790	11.97	1816	12.83	1840	13.69	1864	14.56	1888	15.46	1910	16.34
20500	1780	11.05	1806	11.90	1831	12.76	1856	13.63	1880	14.52	1903	15.41	1926	16.31	1949	17.22
21000	1822	11.84	1848	12.71	1872	13.59	1897	14.48	1920	15.39	1943	16.29	1966	17.23	1988	18.14
21500	1864	12.66	1889	13.55	1914	14.45	1937	15.36	1960	16.29	1983	17.22	2005	18.16	2027	19.11
22000	1899	13.05	1926	14.11	1952	15.16	1977	16.20	2001	17.23	2024	18.24	2047	19.27	2069	20.28
22500	1941	13.91	1967	14.98	1992	16.05	2017	17.12	2041	18.19	2064	19.23	2086	20.27	2108	21.31

Notes:
1. Max fan RPM 1981 For 27" Class II Fan
2. Max Motor Available 15 HP For 27" Fan Size
3. Max motors Available are as follows: 40T: 10 HP & 50–55T: 15 HP
4. Max CFM is as follows: 40T: 18000, 50–55T: 22500
5. Min CFM is as follows: 40T: 7500, 50–55T: 9000
6. Return fan belt drive RPM selections will be available to cover 700-1900 RPM range +/- 50 RPM
7. Performance data includes cabinet and rain hood effect. Damper pressure drop must be added to the return duct static. See Table 59, p. 124- exhaust damper for return fan in Performance Data.
8. Shaded area indicates nonstandard BHP or RPM selections. Contact a local Trane® representative for more information.

Table 75. Return fan performance—60 – 75 tons air-cooled (36.5" fan)

CFM Std Air	Return Fan Static Pressure Including Exhaust Damper P.D.															
	0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
12000	459	1.07	502	1.59	541	2.13	578	2.71	613	3.31	647	3.91	681	4.54	713	5.20
13000	490	1.27	530	1.83	567	2.40	603	3.01	636	3.65	668	4.29	700	4.94	731	5.64
14000	520	1.49	560	2.09	595	2.70	628	3.34	660	3.99	691	4.69	721	5.38	751	6.10
15000	552	1.73	590	2.38	623	3.03	655	3.70	686	4.39	715	5.11	744	5.85	771	6.59
16000	583	2.00	619	2.70	652	3.39	682	4.09	712	4.82	740	5.57	767	6.34	794	7.14
17000	615	2.30	650	3.05	681	3.78	710	4.52	739	5.28	766	6.06	792	6.85	818	7.67
18000	646	2.64	680	3.43	711	4.20	739	4.98	766	5.78	792	6.60	817	7.41	842	8.27
19000	678	3.01	711	3.85	741	4.67	768	5.48	794	6.31	819	7.16	844	8.03	867	8.89
20000	711	3.42	742	4.30	771	5.17	797	6.02	823	6.90	847	7.77	871	8.66	894	9.59
21000	743	3.87	773	4.78	801	5.70	827	6.60	852	7.51	875	8.41	898	9.36	920	10.30
22000	775	4.36	805	5.31	832	6.28	857	7.22	881	8.17	904	9.11	926	10.09	947	11.06
23000	808	4.89	836	5.88	863	6.90	887	7.89	911	8.88	933	9.87	954	10.86	975	11.88
24000	840	5.46	868	6.49	894	7.56	918	8.60	941	9.63	962	10.67	983	11.71	1004	12.75
25000	873	6.08	900	7.15	925	8.26	948	9.35	970	10.42	992	11.49	1012	12.59	1032	13.67
26000	906	6.75	931	7.86	956	9.00	979	10.16	1001	11.28	1021	12.37	1041	13.49	1061	14.63
27000	939	7.47	963	8.62	987	9.79	1010	11.01	1031	12.18	1052	13.33	1071	14.47	1090	15.65

Notes:

1. Max fan RPM 1151 for 36.5" Class I Fan
2. Max motor available 20 HP for 36.5" fan size
3. Max motor available 20 HP for 60, 70 & 75
4. Max CFM is 27000 for 60, 70 & 75
5. Min CFM is 12000 for60, 70 & 75
6. Return fan belt drive RPM selections will be available to cover 500-1100 RPM range +/- 50 RPM
7. Performance data includes cabinet and rain hood effect. Damper pressure drop must be added to the return duct static per Table 59, p. 124.

Table 76. 100% Return fan drive selections — 20 – 75 tons air-cooled

	3 Hp		5 Hp		7.5 Hp		10 Hp		15 Hp		20 Hp	
	RPM	Drive No.	RPM	Drive No.	RPM	Drive No.	RPM	Drive No.	RPM	Drive No.	RPM	Drive No.
20	500 600 700 800 900 1000 1100 1200 1300	5 6 7 8 9 A B C D										
25	500 600 700 800 900 1000 1100 1200 1300	5 6 7 8 9 A B C D	1100 1200 1300 1400 1500 1600	B C D E F G								
30	500 600 700 800 900 1000 1100 1200 1300	5 6 7 8 9 A B C D	1100 1200 1300 1400 1500 1600	B C D E F G	1400 1500 1600	E F G						
40			700 800 900 1000 1100 1200 1300	7 8 9 A B C D	1200 1300 1400 1500	C D E F	1400 1500 1600 1700	E F G H				

Table 76. 100% Return fan drive selections — 20 – 75 tons air-cooled (continued)

	3 Hp		5 Hp		7.5 Hp		10 Hp		15 Hp		20 Hp	
	RPM	Drive No.	RPM	Drive No.	RPM	Drive No.	RPM	Drive No.	RPM	Drive No.	RPM	Drive No.
50–55			700 800 900 1000 1100 1200 1300	7 8 9 A B C D	1200 1300 1400 1500	C D E F	1400 1500 1600 1700	E F G H	1600 1700 1800 1900	G H J K		
60			500 600 700 800	5 6 7 8	700 800 900	7 8 9	800 900 1000	8 9 A	900 1000 1100	9 A B	1100	B
70, 75			500 600 700 800	5 6 7 8	700 800 900	7 8 9	800 900 1000	8 9 A	900 1000 1100	9 A B	1100	B

Electrical Data

Electrical Service Sizing

To correctly size electrical service wiring for a unit, find the appropriate calculations listed below. Each type of unit has its own set of calculations for MCA (Minimum Circuit Ampacity), MOP (Maximum Overcurrent Protection), and RDE (Recommended Dual Element fuse size). Read the load definitions that follow and then find the appropriate set of calculations based on unit type.

Note: *Set 1 is for cooling only and cooling with gas heat units, and set 2 is for cooling with electric heat units.*

Load Definitions: (To determine load values, see the Electrical Service Sizing Data Tables on the following page.)

LOAD1 = Current of the largest motor (compressor or fan motor)

LOAD2 = Sum of the currents of all remaining motors

LOAD3 = Current of electric heaters

LOAD4 = Any other load rated at 1 AMP or more

SAH_ (Cooling Only) units

SXH_ (Extended Casing) units

SLH_ and SSH_ (Cooling with Hydronic Heat) units

SFH_ (Cooling with Gas Heat) units

Load Definitions	
LOAD 1	Current of the largest motor (compressor or fan motor)
LOAD 2	Sum of the currents of all remaining motors
LOAD 3	Current of electric heaters
LOAD 4	Any other load rated at 1 amp or more

Control Power Transformer for All Modes	
20–40 ton units	Add 3 FL Amps
50–75 ton units	Add 6 FL Amps
90–130 ton units	Add 8 FL Amps

Crankcase Heaters for Heating Mode 460/575v Only	
20–30 ton units	Add 1 Amp
40–60 ton units	Add 2 Amps
70–75 ton units	Add 3 Amps
90–130 ton unit	Add 4 Amps

Set 1: Cooling Only Rooftop Units and Cooling with Gas Heat Rooftop Units

MCA = (1.25 x LOAD1) + LOAD2 + LOAD4

MOP = (2.25 x LOAD1) + LOAD2 + LOAD4

Select a fuse rating equal to the MOP value. If the MOP value does not equal a standard fuse size as listed in NEC 240-6, select the next lower standard fuse rating.

Note: *If selected MOP is less than the MCA, then select the lowest standard maximum fuse size which is equal to or larger than the MCA, provided the selected fuse size does not exceed 800 amps.*

RDE = (1.5 x LOAD1) + LOAD2 + LOAD4

Select a fuse rating equal to the RDE value. If the RDE value does not equal a standard fuse size as listed in NEC 240-6, select the next higher standard fuse rating.

Note: *If the selected RDE is greater than the selected MOP value, then select the RDE value to equal the MOP value.*

Set 2: Rooftop units with Electric Heat

Single Source Power units (380V, 415V, 460V, and 575V)

To arrive at the correct MCA, MOP, and RDE values for these units, two sets of calculations must be performed. First calculate the MCA, MOP, and RDE values as if the unit was in cooling mode (use the equations given in Set 1). Then calculate the MCA, MOP, and RDE values as if the unit were in heating mode as follows. (Keep in mind when determining LOADS that the compressors don't run while the unit is in heating mode).

For units using heaters less than 50 kW:

MCA = 1.25 x (LOAD1 + LOAD2 + LOAD4) + (1.25 x LOAD3)

For units using heaters equal to or greater than 50 kW:

MCA = 1.25 x (LOAD1 + LOAD2 + LOAD4) + LOAD3

The nameplate MCA value will be the larger of the cooling mode MCA value or the heating mode MCA value calculated above.

MOP = (2.25 x LOAD1) + LOAD2 + LOAD3 + LOAD4

The selection MOP value will be the larger of the cooling mode MOP value or the heating mode MOP value calculated above.

Select a fuse rating equal to the MOP value. If the MOP value does not equal a standard fuse size as listed in NEC 240-6, select the next lower standard fuse rating.

Note: *If selected MOP is less than the MCA, then select the lowest standard maximum fuse size which is equal to or larger than the MCA, provided the selected fuse size does not exceed 800 amps.*

RDE = (1.5 x LOAD1) + LOAD2 + LOAD3 + LOAD4

The selection RDE value will be the larger of the cooling mode RDE value or the heating mode RDE value calculated above.

Select a fuse rating equal to the RDE value. If the RDE value does not equal a standard fuse size as listed in NEC 240-6, select the next higher standard fuse rating.

Notes:

- *If the selected RDE is greater than the selected MOP value, then select the RDE value to equal the MOP value.*
- *On 90 to 162 ton rooftops, the selected MOP value is stamped in the MOP field on the unit nameplate.*

Dual Source Power units (200V and 230V)

These units will have two circuit values shown on the nameplate. The first circuit value will be the refrigeration (cooling mode) values calculated per Set 1. The second set of circuit values shown on the nameplate will be for the electric heating circuit as follows.

MCA = (1.25 x LOAD3)

MOP = (1.25 x LOAD3)

Select a fuse rating for the electric heating circuit that is equal to the MOP value obtained in the equation above. If the MOP value does not equal a standard fuse size as listed in NEC 240-6, select the next lower standard fuse rating (see note below for exception).

Note: *If the available MOP option is less than the MCA obtained in the equation above, then reselect the lowest standard maximum fuse size which is equal to, or larger, than the MCA, provided the reselected fuse size does not exceed 800 amps.*

RDE = LOAD3

Select a fuse rating for the electric heating circuit that's equal to the RDE value. If the RDE value does not equal a standard fuse size as listed in NEC 240-6, select the next higher standard fuse rating.

Notes:

- *If the selected RDE is greater than the selected MOP value, then reselect the RDE value to equal the MOP value.*
- *The selected MOP value is stamped in the MOP field on the nameplate.*

Service Sizing Data

Table 77. Compressor electrical service sizing data (20 to 130 ton)

Tonnage	No. of Compres-sors	200 V		230 V		460 V		575 V	
		RLA (ea.)	LRA (ea.)	RLA (ea.)	LRA (ea.)	RLA (ea.)	LRA (ea.)	RLA (ea.)	LRA (ea.)
20 Std	2	41.4	267.0	40.3	267.0	19.1	142.0	15.8	103.0
20 Hi Eff	2	41.4	267.0	40.3	267.0	19.1	142.0	15.8	103.0
25 Std	1	41.4	267.0	40.3	267.0	19.1	142.0	15.8	103.0
	1	47.0	304.0	42.3	304.0	20.2	147.0	17.1	122.0
25 Hi Eff	1	41.4	267.0	40.3	267.0	19.1	142.0	15.8	103.0
	1	51.9	315.0	47.0	315.0	22.2	158.0	19.2	136.0
30 Std	2	51.9	315.0	47.0	315.0	22.2	158.0	19.2	136.0
30 Hi Eff	1	51.9	315.0	47.0	315.0	22.2	158.0	19.2	136.0
	1	56.9	351.0	48.8	351.0	25.5	197.0	23.1	146.0
40 Std	2	31.3	203.0	30.4	203.0	13.1	98.0	11.9	84.0
	2	37.3	267.0	31.8	267.0	15.9	142.0	15.2	103.0
40 Hi Cap & Hi Eff	4	37.3	267.0	31.8	267.0	15.9	142.0	15.2	103.0
40 Vari Spd	1	59.9	N/A	52.0	N/A	26.0	N/A	21.7	N/A
	1	31.3	203.0	30.4	203.0	13.1	98.0	11.9	84.0
	1	37.3	267.0	31.8	267.0	15.9	142.0	15.2	103.0
50 Std	4	41.4	267.0	40.3	267.0	19.1	142.0	15.8	103.0
50 Hi Cap & Hi Eff	2	41.4	267.0	40.3	267.0	19.1	142.0	15.8	103.0
	2	47.0	304.0	42.3	304.0	20.2	147.0	17.1	122.0
50 Vari Spd	1[a]	75.2	N/A	65.2	N/A	32.6	N/A	27.5	N/A
	1	41.4	267.0	40.3	267.0	19.1	142.0	15.8	103.0
	1	47.0	304.0	42.3	304.0	20.2	147.0	17.1	122.0
55 Std & Hi Eff	4	47.0	304.0	42.3	304.0	20.2	147.0	17.1	122.0
55 Vari Spd	1[a]	75.2	N/A	65.2	N/A	32.6	N/A	27.5	N/A
	1	47.0	304.0	42.3	304.0	20.2	147.0	17.1	122.0
	1	51.9	315.0	47.0	315.0	22.2	158.0	19.2	136.0
60 Std	2	47.0	304.0	42.3	304.0	20.2	147.0	17.1	122.0
	2	51.9	315.0	47.0	315.0	22.2	158.0	19.2	136.0
60 Hi Cap & Hi Eff	4	51.9	315.0	47.0	315.0	22.2	158.0	19.2	136.0
60 Vari Spd	1[a]	89.9	N/A	77.9	N/A	38.9	N/A	32.7	N/A
	1	51.9	315.0	47.0	315.0	22.2	158.0	19.2	136.0
	1	56.9	351.0	48.8	351.0	25.5	197.0	23.1	146.0
70 Std & Hi Eff	4	56.9	351.0	48.8	351.0	25.5	197.0	23.1	146.0
70 Vari Spd	1[a]	89.9	N/A	77.9	N/A	38.9	N/A	32.7	N/A
	1	60.5	320.0	52.0	320.0	25.4	160.0	20.3	135.0
	1	83.9	485.0	74.5	485.0	37.2	215.0	29.8	175.0
75 Std	2	60.5	320.0	52.0	320.0	25.4	160.0	20.3	135.0
	2	83.9	485.0	74.5	485.0	37.2	215.0	29.8	175.0
75 Hi Cap & Hi Eff	2	60.5	320.0	52.0	320.0	25.4	160.0	20.3	135.0
	2	83.9	485.0	74.5	485.0	37.2	215.0	29.8	175.0
75 Vari Spd	1[a]	89.9	N/A	77.9	N/A	38.9	N/A	32.7	N/A
	2	60.5	320.0	52.0	320.0	25.4	160.0	20.3	135.0
	1	83.9	485.0	74.5	485.0	37.2	215.0	29.8	175.0
90 Std & Hi Cap	4	N/A	N/A	N/A	N/A	37.2	215.0	29.8	175.0
105 Hi Cap	2	N/A	N/A	N/A	N/A	37.2	215.0	29.8	175.0
	2	N/A	N/A	N/A	N/A	45.0	260.0	36.0	210.0
115 Std	2	N/A	N/A	N/A	N/A	37.2	215.0	29.8	175.0
	2	N/A	N/A	N/A	N/A	45.0	260.0	36.0	210.0
130 Std	4	N/A	N/A	N/A	N/A	45.0	260.0	36.0	210.0

[a] Variable Speed Compressor

Table 78. Electrical service sizing data — motors — 20 to 130 tons

Tonnage	200 V	230 V	460 V	575 V
	FLA	FLA	FLA	FLA
Air-Cooled Condenser Fan Motor				
20	8.2	8.2	3.6	2.8
25	12.3	12.3	5.4	4.2
30	12.3	12.3	5.4	4.2
40	16.4	16.4	7.2	5.6
50, 55	24.6	24.6	10.8	8.4
60	24.6	24.6	10.8	8.4
70	24.6	24.6	10.8	8.4
75	24.6	24.6	10.8	8.4
90	N/A	N/A	14.4	11.2
105	N/A	N/A	18.0	14.0
115	N/A	N/A	18.0	14.0
130	N/A	N/A	21.6	16.8
Motor Horsepower	**Supply/Exhaust/Return Fan Motor (4 pole)**			
3	9.7	8.4	4.2	3.4
5	15.3	13.2	6.6	5.3
7.5	22.8	19.5	9.8	7.8
10	29.5	25.2	12.6	10.1
15	42.4	36.0	18.0	15.0
20	56.1	49.4	24.7	19.5
25	70.1	61.0	30.5	24.8
30	82.2	73.2	36.6	29.0
40	N/A	N/A	49.0	39.0
50	N/A	N/A	59.0	47.2
Motor Horsepower	**Supply Fan Motor (6 pole)**			
3	10.1	9.0	4.5	3.7
5	17.0	14.8	7.4	5.8
7.5	25.0	22.0	11.0	8.6
10	32.0	28.6	14.3	11.5
15	47.0	41.0	20.5	16.0
20	63.0	54.0	27.0	22.0

Notes:

1. FLA is for individual motors by HP, not total unit supply fan HP.
2. Return fan motors are available in 3-20 Hp
3. 40 & 50 Hp motor available as standard in 460 & 575 volt only
4. DDP fans selected under 1,600 RPM will have 6-pole motors

Table 79. Electrical service sizing data —electric heat module (electric heat units only) — 20 to 130 tons

Module kW	Voltage			
	200 FLA	230 FLA	460 FLA	575 FLA
30	83.3	72.2	36.1	28.9
50	138.8	120.3	60.1	48.1
70	194.3	168.4	84.2	67.4
90	249.8	216.5	108.3	86.6
110	305.3	264.6	132.3	105.9
130			156.4	125.1
150			180.4	144.3
170			204.5	163.6
190			228.5	182.8

Note: Electric heat FLA are determined at 208, 240, 480 and 600 volts.

Table 80. Electrical service sizing data — control power transformer heating and cooling modes — 20 to 130 tons

Nominal Tons Air Cooled	Digit 2 Unit Function	Voltage			
		200	230	460	575
20,25,30	A,E,L,S,X	1	1	1	1
	F	4	3	2	1
40,50,55,60	A,E,L,S,X	3	2	1	1
	F	5	4	2	2
70,75	A,E,L,S,X	5	4	2	2
	F	8	7	3	3
90,105,115,130	E,L,S,X	5	4	2	2
	F	8	7	3	3

Table 81. Electrical service sizing data — crankcase heaters (heating mode on 460/575 volt only) — 20 to 130 tons

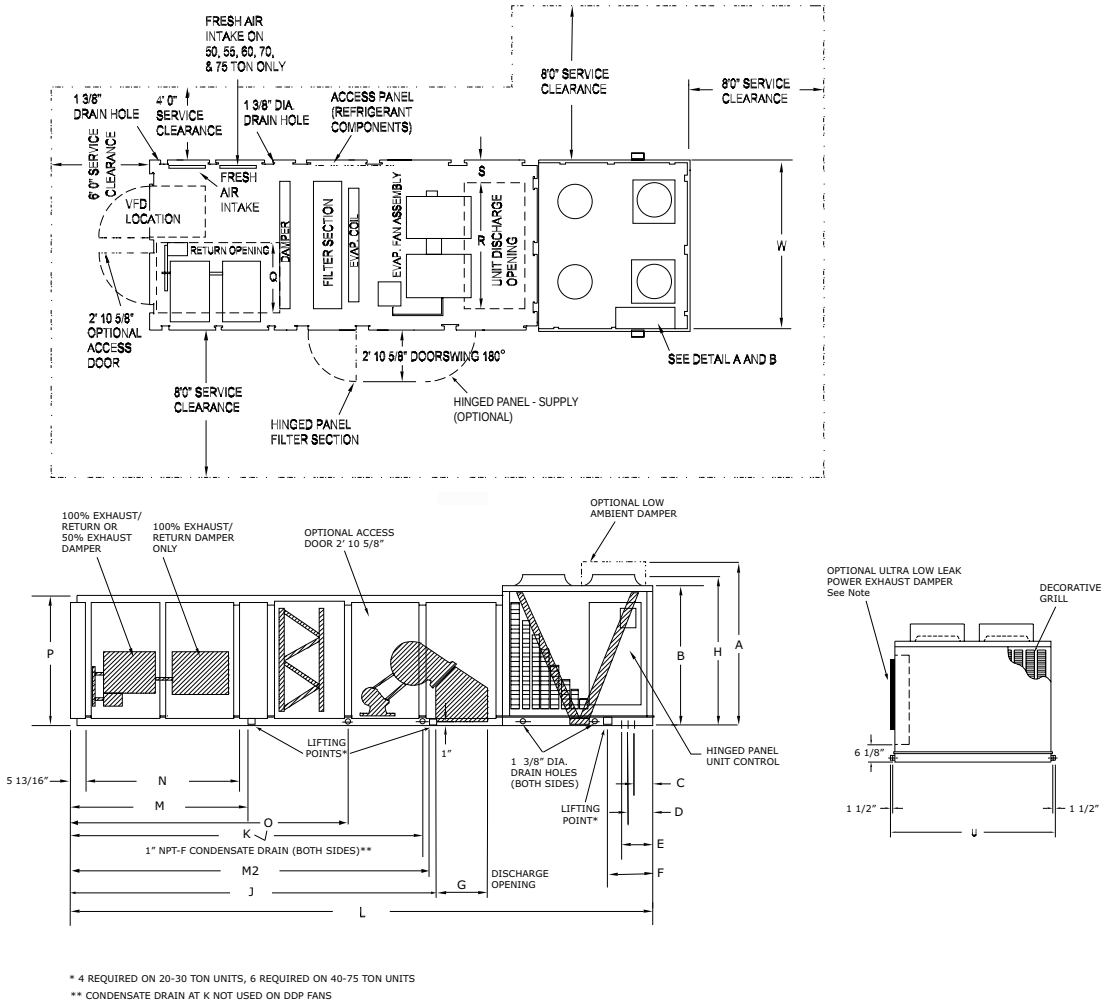
Nom Tons (AC/EC)	(Add) FLA
20,25,30	1
40,50,55,60	2
70,75	3
90-105	3
115-130	4

Table 82. Voltage utilization range

Unit Voltage	Voltage Utilization Range
200/60/3	180-220
230/60/3	207-253
380/50/3	342-418
415/50/3	373-457
460/60/3	414-506
575/60/3	517-633

Dimensional Data

Figure 34. Heating/cooling unit dimensions (ft. in.) — 24-89 ton evaporative condensing



* 4 REQUIRED ON 20-30 TON UNITS, 6 REQUIRED ON 40-75 TON UNITS

** CONDENSATE DRAIN AT K NOT USED ON DDP FANS

Table 83. Cooling only unit dimensions (ft. in.) - SAHL

Nom. Tons	H	L	W	A	B	C	D	E	F	G	J
20, 25	7-3 1/4	21-9 3/4	7-6 1/2	7-10 5/8	6-9	0-9 1/2	1-3 5/8	1-7 9/16	1-3 1/2	2-2 1/2	14-0 1/4
30	7-3 1/4	21-9 3/4	7-6 1/2	7-10 5/8	6-9	0-9 1/2	1-3 5/8	1-7 9/16	1-3 1/2	2-2 1/2	14-0 1/4
40	7-3 1/4	29-8	7-6 1/2	7-10 5/8	6-9	0-9 7/8	1-5 7/8	1-10 1/8	2-5	2-5	16-7 13/16
50, 55	7-3 1/4	29-8	7-6 1/2	7-10 5/8	6-9	0-9 1/2	1-5 7/8	1-10 1/8	2-5	2-5	16-7 13/16
60	7-3 1/4	29-8	9-8	7-10 5/8	6-9	0-9 7/8	1-5 7/8	1-10 1/8	2-5	2-5	16-7 13/16
70, 75	7-3 1/4	29-8	9-8	7-10 5/8	6-9	0-9 7/8	1-5 7/8	1-10 1/8	2-5	2-5	16-7 13/16

K	M	M2	N		O	P	Q		R	S	U
			w/ exhaust fan	w/return fan			w/ exhaust fan	w/return fan			
12-6	7-0	N/A	6-6 15/16	3	10-7	3-9 5/16	3-4 3/8	2 - 9 15/16	5-7	0-11 3/4	7-9 1/2
12-6	7-0	N/A	6-6 15/16	3	10-7	4-9 5/16	3-4 3/8	2 - 9 15/16	5-7	0-11 3/4	7-9 1/2
15-4 15/16	8-0	16-2 5/16	7-8 3/16	3 - 4	12-1	5-9 5/16	3-4 3/8	3 - 1 1/2"	5-7	0-11 3/4	7-9 1/2
15-4 15/16	8-0	16-2 5/16	7-8 3/16	3 - 4	12-1	6-9 3/8	3-4 3/8	3 - 1 1/2"	5-7	0-11 3/4	7-9 1/2
15-4 15/16	8-0	16-2 5/16	7-8 3/16	4 - 5	12-1	5-9 5/16	4-5 3/8	4 - 2 1/2"	6-10 7/8	1-4 9/16	9-11
15-4 15/16	8-0	16-2 5/16	7-8 3/16	4 - 5	12-1	5-9 5/16	4-5 3/8	4 - 2 1/2"	6-10 7/8	1-4 9/16	9-11

Note:

Figure 35. Heating/cooling unit dimensions - 20 to 75 tons air-cooled

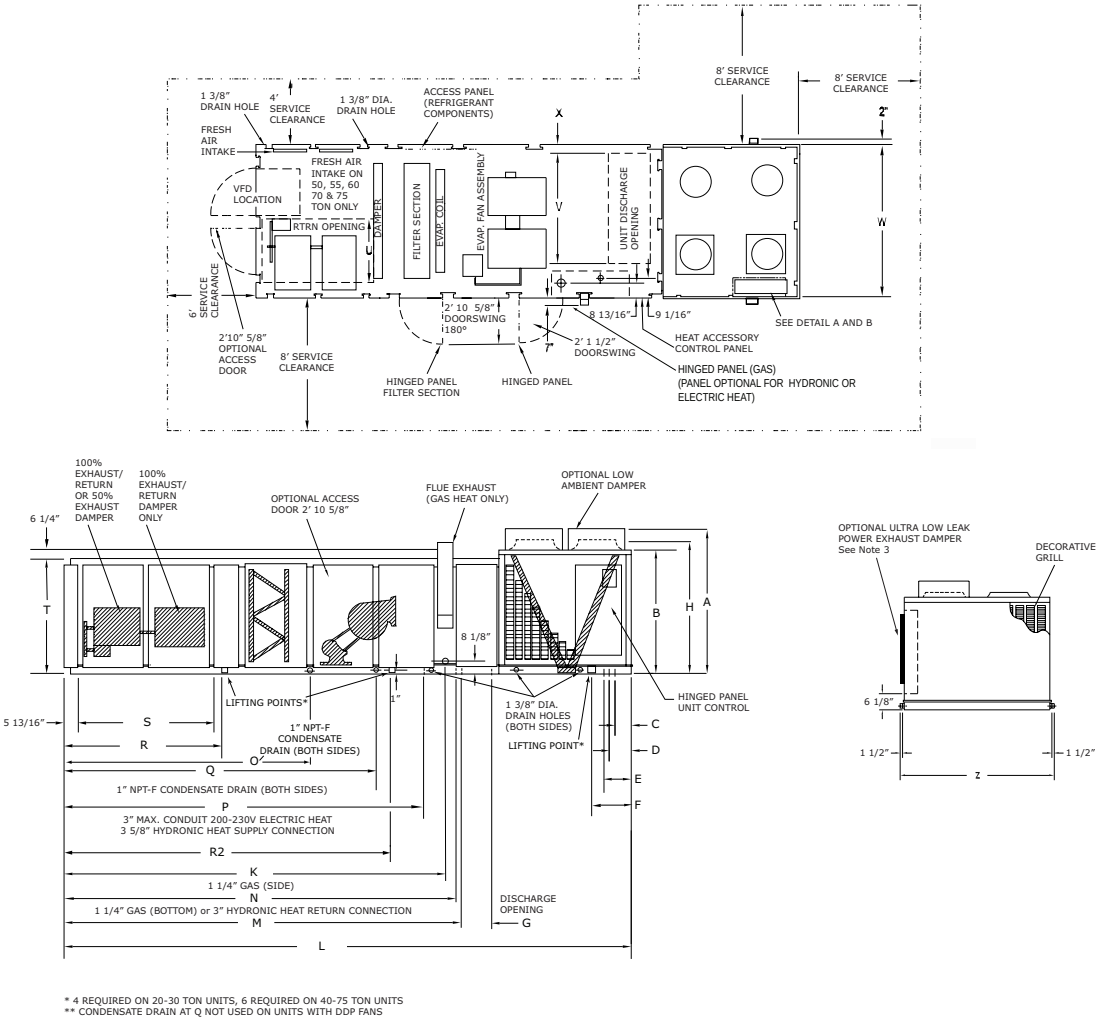


Table 84. Heating/cooling unit dimensions (ft. in.) - air-cooled - SEHL, SFHL, SSHL, SLHL, SXHL

Nom. Tons	H	L	W	A	B	C	D	E	F
20, 25	7-3 1/4	24-1 3/8	7-6 1/2	7-10 5/8	6-9	0-9 1/2	1-3 5/8	1-7 9/16	1-3 1/2
30	7-3 1/4	24-1 3/8	7-6 1/2	7-10 5/8	6-9	0-9 1/2	1-3 5/8	1-7 9/16	1-3 1/2
40	7-3 1/4	32-10 1/2	7-6 1/2	7-10 5/8	6-9	0-9 7/8	1-5 7/8	1-10 1/8	2-5
50, 55	7-3 1/4	32-10 1/2	7-6 1/2	7-10 5/8	6-9	0-9 7/8	1-5 7/8	1-10 1/8	2-5
60	7-3 1/4	32-10 1/2	9-8	7-10 5/8	6-9	0-9 7/8	1-5 7/8	1-10 1/8	2-5
70, 75	7-3 1/4	32-10 1/2	9-8	7-10 5/8	6-9	0-9 7/8	1-5 7/8	1-10 1/8	2-5

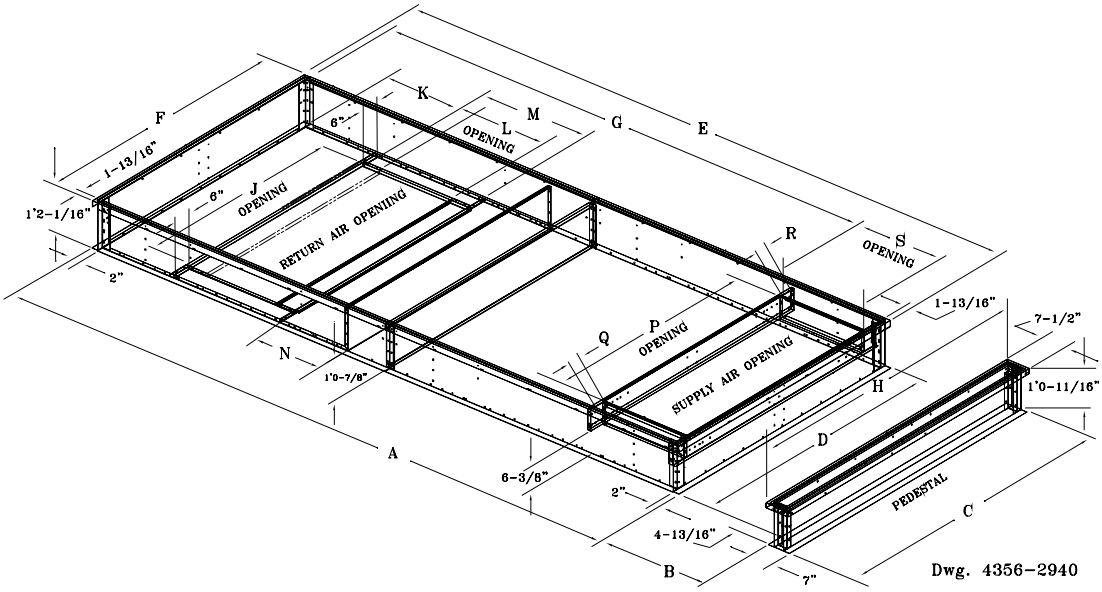
Nom. Tons	G	J	K	M	N	O	P	Q	R
20, 25	2-2 1/2	16-9 3/4	16-6	16-3 13/16	16-7	10-7	15-5 5/16	13-3	7-0
		16-9 3/4	16-6						
30	2-2 1/2	16-9 3/4	16-6	16-3 13/16	16-7	10-7	18-11 11/16	15-4 15/16	8-0
		16-9 3/4	16-6						
40	2-5	20-1 3/4	19-6	19-10 5/16	19-7	12-1	18-11 11/16	15-4 15/16	8-0
		20-6 3/4	20-3						
50, 55	2-5	20-1 3/4	19-6	19-10 5/16	19-7	12-1	15-5 5/16	13-3	7-0
		20-6 3/4	20-3						
60	2-5	20-1 3/4	19-6	19-10 5/16	19-7	12-1	18-11 11/16	15-4 15/16	8-0
		20-6 3/4	20-3						
70, 75	2-5	20-1 3/4	19-6	19-10 5/16	19-7	12-1	18-11 11/16	15-4 15/16	8-0
		20-6 3/4	20-3						

Table 84. Heating/cooling unit dimensions (ft. in.) - air-cooled - SEHL, SFHL, SSHL, SLHL, SXHL (continued)

Nom. Tons	R2	S		T	U		V	X	Z
		w/Exh Fan	w/ Ret Fan		w/Exh Fan	w/ Ret Fan			
20, 25	N/A	6-6 15/16	3-0	3-9 5/16	3-4 3/8	2-9 15/16	5-7	0-5 13/16	7-9 1/2
30	N/A	6-6 15/16	3-0	4-9 5/16	3-4 3/8	2-9 15/16	5-7	0-5 13/16	7-9 1/2
40	16-2 5/16	7-8 3/16	3-4	5-9 5/16	3-4 3/8	3-1½	5-7	0-5 13/16	7-9 1/2
50, 55	16-2 5/16	7-8 3/16	3-4	6-9 3/8	3-4 3/8	3-1½	5-7	0-5 13/16	7-9 1/2
60	16-2 5/16	7-8 3/16	4-5	5-9 5/16	4-5 3/8	4-2½	7-8½	0-5 13/16	9-11
70, 75	16-2 5/16	7-8 3/16	4-5	5-9 5/16	4-5 3/8	4-2½	7-8½	0-5 13/16	9-11

Notes:
1. Unit drawing is representative only and may not accurately depict all models.
2. Use high gas heat J dimension for all hydronic heat connections.
3. Optional Ultra Low Leak Power Exhaust extends beyond lifting lug and increases overall "Z" dimension by 0.65".

Figure 36. Optional roof curb dimensions (downflow) — 20 - 75 ton air cooled



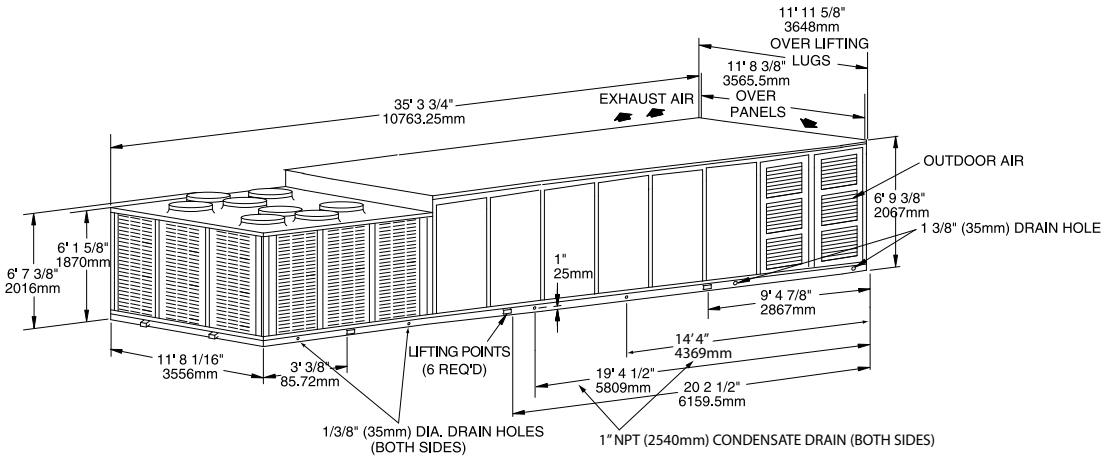
Note: *The pedestal was purposely designed 1–3/8" shorter than the curb because the unit base rails rest on the pedestal at one point and on the curb at a different point.*

Table 85. Downflow roof curb dimensions (ft. in.) — 20 - 75 ton air cooled

Tons	Model	A	B	C	D	E	F	G	H	J
20,25,30	SAHL	16'-3 7/8"	2'-10 1/16"	7'-10 7/16"	7'-0 13/16"	16'-3 9/16"	7'-0 1/2"	13'-6 15/16"	7'-11 15/16"	5'-8 13/16"
	S*HL	18'-7 1/2"	2'-10 1/16"	7'-10 7/16"	7'-0 13/16"	18'-7 3/16"	7'-0 1/2"	15'-10 9/16"	7'-11 15/16"	5'-8 13/16"
4048, 505559	SAHL	19'-1 15/16"	7'-10 1/16"	7'-10 7/16"	7'-0 13/16"	19'-1 5/8"	7'-0 1/2"	16'-2 9/16"	7'-11 15/16"	5'-8 13/16"
	S*HL	22'-4 1/2"	7'-10 1/16"	7'-10 7/16"	7'-0 13/16"	22'-4 1/8"	7'-0 1/2"	19'-5"	7'-11 15/16"	5'-8 13/16"
60,70,757-3,80,89	SAHL	19'-1 15/16"	7'-10 1/16"	9'-11 15/16"	9'-2 5/16"	19'-1 5/8"	9'-2"	16'-2 9/16"	10'-1 7/16"	7'-10 5/16"
	S*HL	22'-4 1/2"	7'-10 1/16"	9'-11 15/16"	9'-2 5/16"	22'-4 1/8"	9'-2"	19'-5"	10'-1 7/16"	7'-10 5/16"

Tons	Model	K	L	M	N	P	Q	R	S
20,25,30	SAHL	2'-0"	2'-5 5/16"	2'-11 5/16"	1'-10 5/8"	5'-9 1/2"	0'-5 11/16"	0'-5 11/16"	2'-3 5/16"
	S*HL	2'-0"	2'-5 5/16"	2'-11 5/16"	1'-10 5/8"	5'-7 3/8"	1'-0 7/16"	0'-1"	2'-3 5/16"
4048, 505559	SAHL	2'-0"	3'-6"	4'-0"	1'-10 5/8"	5'-9 1/2"	0'-5 11/16"	0'-5 11/16"	2'-5 15/16"
	S*HL	2'-0"	3'-6	4'-0	1'-10 5/8"	5'-7 3/8"	0'-11 3/16"	0'-2 1/4"	2'-5 15/16"
60,70,757-3,80,89	SAHL	2'-0"	3'-6"	4'-0"	1'-10 5/8"	6'-11 7/8"	0'-11 3/16"	0'-11 3/16"	2'-5 15/16"
	S*HL	2'-0"	3'-6"	4'-0"	1'-10 5/8"	7'-8 3/4"	0'-11 3/16"	0'-2 3/8"	2'-5 15/16"

Figure 37. Heating/cooling and cooling only rooftops — 90, 105, 115, 130 ton air-cooled



Note: *Ultra low leak power exhaust damper option extends 0.65" beyond lifting lugs.*

Figure 38. Roof curb heating/cooling and cooling only rooftops — 90, 105, 115, 130 ton air-cooled

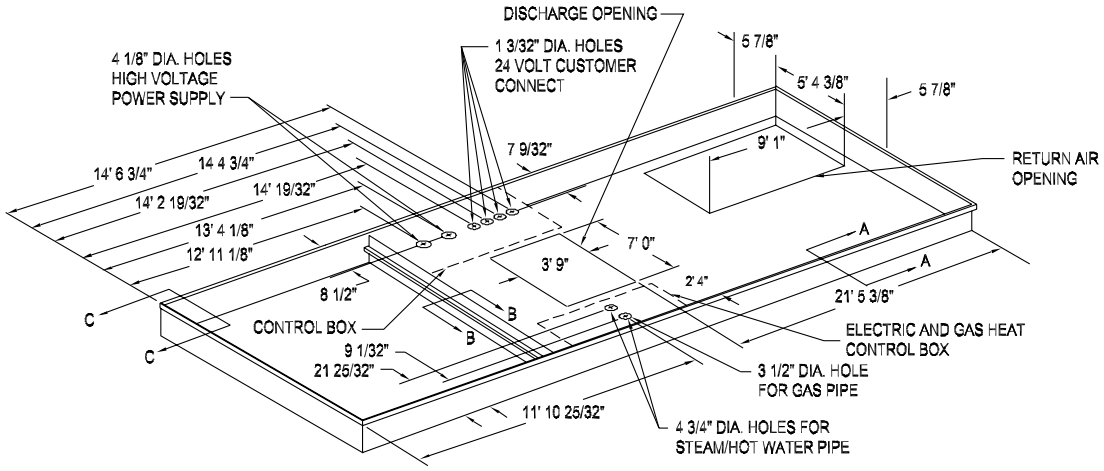
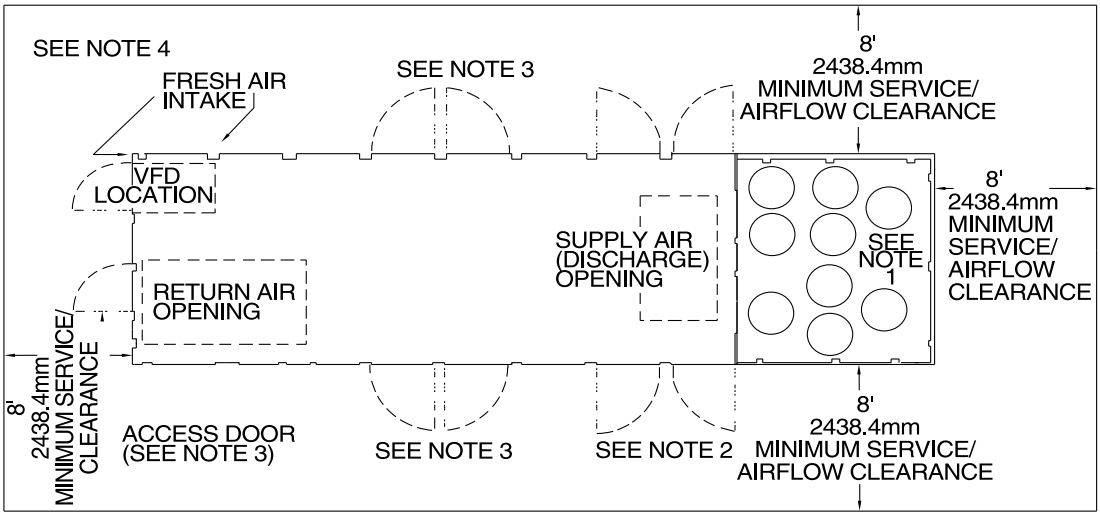


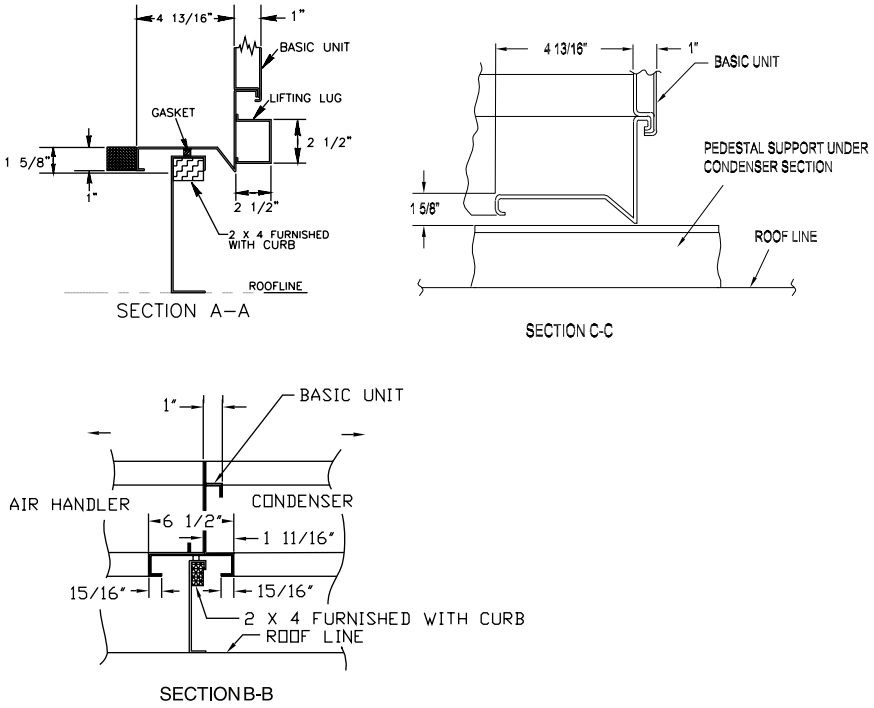
Figure 39. Service clearance — 90 to 130 tons air-cooled



Notes:

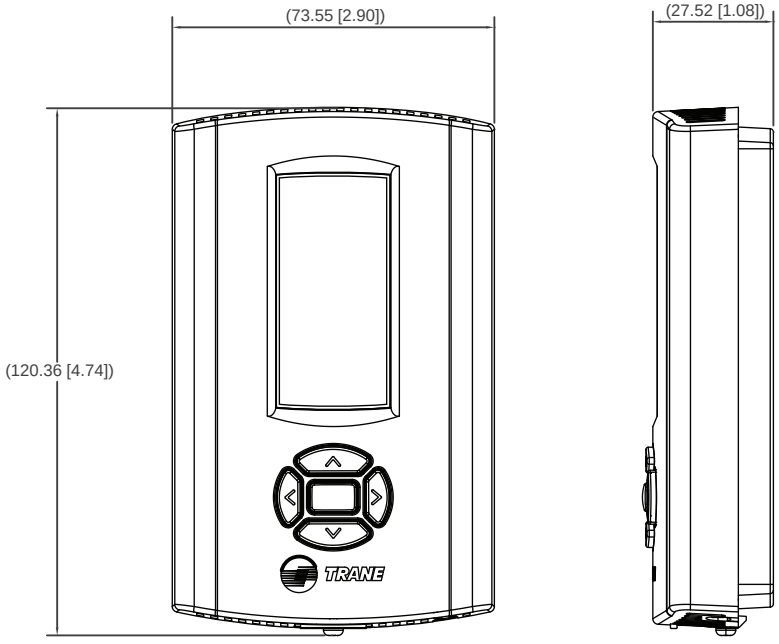
- *Provide unrestricted clearance over the condenser fans.*
- *A minimum clearance of 2' 4½" is required to open the hinged control panel doors. Both doors swing outward in a 180-degree arc.*
- *A minimum clearance of 2' 10¾" is required to open the access doors on the unit's supply fan, evaporator, filter and exhaust fan sections. All hinged doors swing outward in a 180-degree arc.*
- *90-130 ton models have two outdoor air intakes located at the back of the unit and one small outdoor air intake located at the end of the unit.*
- *A minimum clearance of 3' 7" is required to open the hinged access panel door to the VFD enclosure.*
- *Unit drawing is representative only and may not accurately depict all models.*

Figure 40. Cross section through roof curb and base pan



Field-Installed Sensors

Figure 41. Field installed zone sensor—programmable night setback sensor (BAYSENS119*)



Note: *Remote sensors are available for use with all zone sensors to provide remote sensing capabilities.*

Figure 42. Field installed zone sensor—with timed override button and local setpoint adjustment (BAYSENS074*), with timed override only (BAYSENS073*), sensor only (BAYSENS077*)

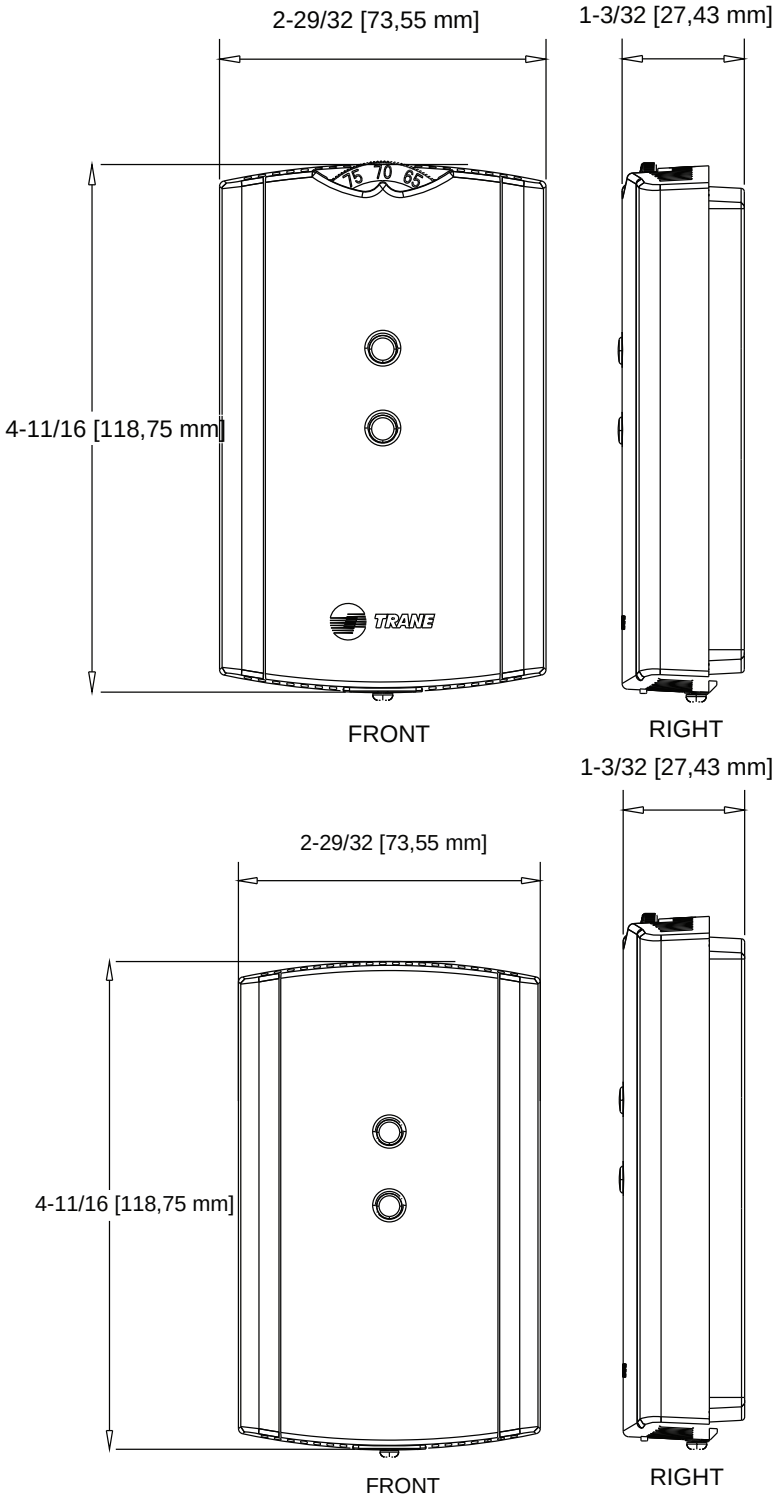


Figure 43. Field installed temperature sensor (BAYSENS016*)

Figure 44. Field installed remote minimum position potentiometer control (BAYSTAT023*)

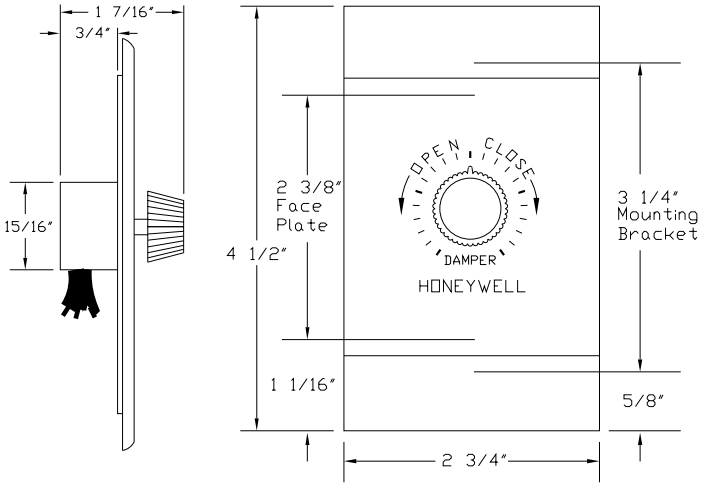
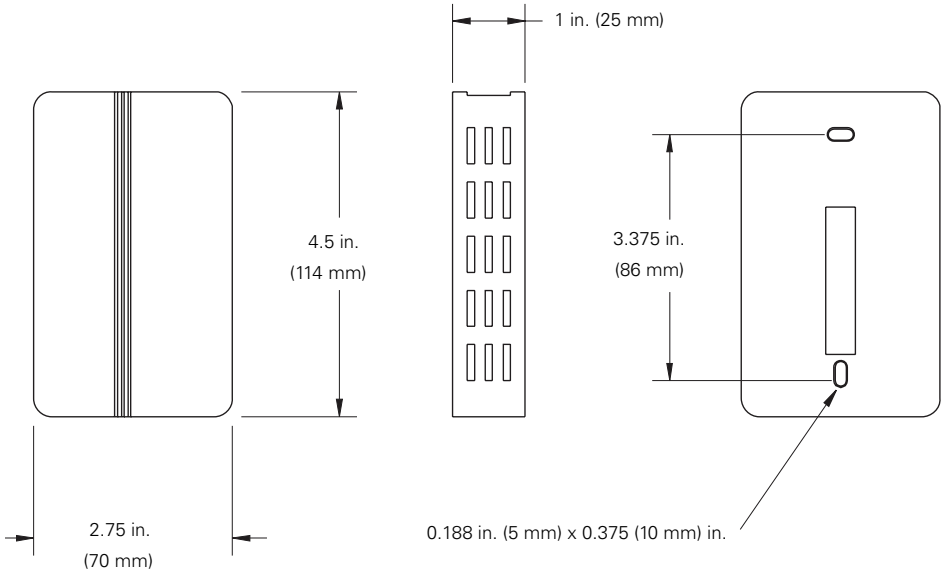


Figure 45. Field installed humidity sensor—wall (BAYSENS036*) or duct mount (BAYSENS037*)



Weights

Table 86. Air-cooled condenser - approximate operating weights (lbs.)

Unit	Without Exhaust Fan					With Exhaust Fan				
	SA	SX	SE	SF	SL/SS	SA	SX	SE	SF	SL/SS
20	4578	4899	5164	5419	5289	4970	5290	5555	5810	5680
25	4582	4902	5167	5422	5292	4984	5304	5569	5824	5694
30	5005	5351	5616	5871	5741	5580	5926	6191	6446	6316
40	7090	7445	7770	8160	7980	7886	8241	8566	8956	8776
50	7504	7954	8279	8669	8489	8393	8843	9168	9558	9378
55	7504	7954	8279	8669	8489	8393	8843	9168	9558	9378
60	8775	9421	9746	10236	10231	9902	10548	10872	11363	11358
70	8948	9593	9918	10408	10403	11075	10721	11045	11534	11530
75	9280	9926	10251	10741	10736	10407	11053	11378	11868	11863
90	x	12493	12648	13293	13343	x	13831	13986	14631	14681
105	x	13126	13281	13926	13976	x	14464	14619	15264	15314
115	x	13330	13485	14130	14180	x	14668	14823	15468	15518
130	x	13616	13771	14416	14466	x	14954	15109	15754	15829

Notes:

1. Weights shown are for air-cooled units with standard capacity, standard efficiency and include the following features: FC fans, VFD(s), standard scroll compressors, 100% economizer, throwaway filters, maximum motor sizes, 460V XL start, high capacity heat.
2. Weights shown represent approximate operating weights and have a ±10% accuracy. To calculate weight for a specific unit configuration, utilize TOPSS™ or contact the local Trane® sales representative. ACTUAL WEIGHTS ARE STAMPED ON THE UNIT NAMEPLATE.

Table 87. Roof curb max weight (lbs./kg.)

Unit	Roof Curb Max. Weight	
	SAHL	S*HL
20, 25, 30	490	510
40, 50, 55	515	550
60, 70, 75	610	640
90-130	N/A	770

Note: Roof curb weights include the curb and pedestal.

Options

Table 88. Comprehensive listing of available options and accessories

Option or Accessory[a]	Option	Factory Design Special[b] [c]	Standard Field-Installed Accessory
Coils			
Corrosion Protected evaporator coils		X	
Copper finned evaporator coils (20 to 75 tons only)		X	
Corrosion protected condenser coil	X	X	
Copper finned air-cooled condenser coils		X	
Controls			
LonTalk® Communication Interface (LCI)	X		X
BACnet® Communication Interface (BCI)	X		X
Trane® Air-Fi™ Wireless Communications Interface (WCI)	X		
Generic BAS (Building Automation System) interface	X		
Inter-Processor Communication Bridge	X		X
Remote Human Interface Panel (controls up to four units)	X		
Remote minimum position control for economizer			X
Fault detection and diagnostics with ultra low leak economizer option	X		
Single Zone VAV	X		
Rapid Restart	X		
Outside Air Measurement (Traq™)	X		
Trane® Communication Interface Module: ICS interface control module (TCI)	X		
Variable frequency drive (VFD) control of supply/exhaust/return fan motor	X		
Ventilation override module (five ventilation override sequences)	X		
Supply Fan Piezometer	X		
Dampers			
0-25 percent manual dampers	X		
Barometric relief exhaust dampers		X	
Low ambient control dampers-0°F (20 to 75 tons)	X		
Low ambient control dampers (90 to 130 tons)		X	
Low leak dampers for 0-100 percent modulating outside air economizer	X		
Ultra low leak economizer and exhaust	X		
Drain Pans			
Positively sloping evaporator coil drain pan	X		
Stainless steel positively sloping evaporator coil drain pan	X		
Economizer			
0-100 percent modulating outside air economizer	X		
Economizer control options: comparative enthalpy, reference enthalpy, dry bulb	X		

Table 88. Comprehensive listing of available options and accessories (continued)

Option or Accessory[a]	Option	Factory Design Special[b] [c]	Standard Field-Installed Accessory
Low or ultra low modulating outside air economizer option	X		
Electrical			
Convenience outlet (factory-powered 15A GFI)	X		
Dual power source		X	
Non-fused unit disconnect - through-the-door with external handle	X		
Phase monitors (200/230/460/575V) (S_HL 20 to 75 tons)	X		
Phase monitors (460/575; S_HK 90 to 130 tons)		X	
Power factor correction capacitors - compressors and fans		X	
High fault SCCR (short circuit current rating)	X		
Evaporative Condenser (S_HL only)			
Evaporative condenser	X		
Sump heater	X		
Dolphin WaterCare® system	X		
Conductivity controller	X		
Fans			
100 percent modulating exhaust with or without Statitrac™ space pressure control	X		
100 percent modulating return with or without Statitrac™ space pressure control	X		
50 percent modulating exhaust	X		
eDrive™ direct drive plenum supply fans (20 to 75 tons)	X		
Horizontal Return fans		X	
Filters, Filter Racks and Related Tools			
90-95 percent bag filters	X		
90-95 percent cartridge filters	X		
90-95 percent bag or cartridge final filters and rack		X	
HEPA filters		X	
Filter rack only (no filters)	X		
Final filters, cartridge (SX only)	X		
Filter rack - 4" deep panel rack placed in standard rack location		X	
High efficiency throwaway filters	X		
Differential pressure gauge	X		
Heat			
Heating options: natural gas, electric, hot water or steam	X		
Modulating Gas Heat - 4:1 or ultra	X		
Propane (LP) conversion / Modulating LP heat		X	
Insulation			
Double wall with perforated interior liner	X	X	

Table 88. Comprehensive listing of available options and accessories (continued)

Option or Accessory[a]	Option	Factory Design Special[b] [c]	Standard Field-Installed Accessory
Solid double wall		X	
Motors			
40 & 50 hp 200 and 230 volt motors - supply fan		X	
Totally enclosed motors		X	
Motors with internal shaft grounding ring for VFD applications	X		
Other			
eFlex™ Variable Speed Compressors (40 to 75 ton)	X		
Digital Scroll Compressor (20 to 30 tons)	X	X	
Extended grease lines	X		
Modulating hot gas reheat (20 to 75 tons air-cooled)	X		
Hinged access doors	X		
Horizontal supply and return openings (SX,SL,SS,SL models)		X	
Hot gas bypass to the evaporator inlet	X		
IntelliPak™ Replacement Unit (IRU)	X		
Outside air CFM compensation on VAV units with VFD and economizer	X		
Replaceable core filter driers		X	
Roof curbs			X
Special paint colors		X	
Spring isolators	X		
Suction service valves		X	
Vertical discharge, S_HL 20 to 75 tons (SX,SL,SS,SL models only)		X	
VFD - Enclosure for field-installed VFD		X	
Sensors and Thermostats			
Humidity sensor			X
ICS zone sensors used with Tracer® system for zone control			X
High duct temperature thermostats	X		
Outdoor temperature sensor for units without economizers			X
Programmable sensors with night set back — CV and VAV			X
Remote zone sensors — used for remote sensing with remote panels			X
Sensors without night set back — CV and VAV			X
Warranty			
10 year limited warranty on Full and Ultra Modulation Gas Heat	X		

[a] Options are provided for informational purposes only. For specifics, contact your local Trane® sales office.
[b] Special options may be subject to a net price add.
[c] For information on agency approval for special designs, contact your local Trane® sales office.

Mechanical Specifications

General

Units shall be specifically designed for outdoor rooftop installation on a roof curb and be completely factory assembled and tested, piped, internally wired, fully charged with R-410A compressor oil, factory run tested and shipped in one piece. Units shall be available for direct expansion cooling only, or direct expansion cooling with natural gas, electric, hot water or steam heating. Filters, outside air system, exhaust air system, optional non-fused disconnect switches and all operating and safety controls shall be furnished factory installed.

All units shall be UL listed to US and Canadian Safety Standards. Cooling capacity shall be rated in accordance with AHRI Standard 360. All units shall have decals and tags to aid in service and indicate caution areas. Electrical diagrams shall be printed on long life water resistant material and shall ship attached to control panel doors.

Casing

Exterior panels shall be zinc coated galvanized steel, phosphatized and painted with a slate gray air-dry finish durable enough to withstand a minimum of 672 hours consecutive salt spray application in accordance with standard ASTM B117. Screws shall be zinc-plus-zinc chromate coated.

Heavy gauge steel hinged access panels with tiebacks to secure door in open position shall provide access to filters and heating sections. Refrigeration components, supply air fan and compressor shall be accessible through removable panels as standard. Unit control panel, filter section, and gas heating section shall be accessible through hinged access panels as standard. Optional double wall construction hinged access doors shall provide access to filters, return/exhaust air, heating and supply fan section. All access doors and panels shall have neoprene gaskets. Interior surfaces or exterior casing members shall have ½ inch fiberglass insulation.

Unit base shall be watertight with heavy gauge formed load-bearing members, formed recess and curb overhang. Unit lifting lugs shall accept chains or cables for rigging. Lifting lugs shall also serve as unit tie down points.

Refrigeration System

Compressors

The Trane Scroll compressor shall be industrial grade, direct drive 3600 RPM maximum speed scroll type. The motor shall be suction gas-cooled hermetic design. Compressor shall have centrifugal oil pump with dirt separator, oil sight glass, and oil charging valve. Compressor shall also be provided with thermostatic motor winding temperature control to protect against excessive motor temperatures resulting from over-/under-voltage or loss of charge, high and low pressure cutouts, and reset relay.

eFlex™ Variable Speed Compressors (200/230/460/575V)

Trane® eFlex™ variable speed compressors shall be capable of speed modulation from 25 Hz to a maximum of 100 Hz. The minimum unit capacity shall be 15% of full load or less. The compressor motor shall be a permanent magnet type. Each compressor shall have a crankcase heater installed, properly sized to minimize the amount of liquid refrigerant present in the oil sump during off cycles. Compressors shall be equipped with a bearing oil injection system that optimizes bearing and scroll set lubrication, sealing, and controls the oil circulation rate. Optimal bearing lubrication shall be provided by a gear oil pump.

Each variable speed compressor shall be matched with a specially designed variable frequency drive which modulates the speed of the compressor motor and provides several compressor protection functions. Control of the variable speed compressor and inverter shall be integrated with the IPak unit controller to ensure optimal equipment reliability and efficiency.

Phase Monitor

Standard on 20 to 75 tons air-cooled . Phase monitor shall protect 3-phase equipment from phase loss, phase reversal and phase imbalance. Any fault condition shall produce a Failure Indicator LED and send the unit into an auto stop condition. cULus approved.

Power Supplies

The 20 to 75 tons air-cooled rooftops shall be available with 200, 230, 460, and 575 voltage power supplies and 90 to 130 tons units shall be available with 460 or 575 voltage power supplies.

Evaporator Coil

Evaporator coil shall have internally enhanced copper tubing of 3/8 or 1/2-inch O.D. mechanically bonded to heavy-duty aluminum fins of configured design. All coils shall be equipped with thermal expansion valves and factory pressure and leak tested.

Air-Cooled Condensing

Air-Cooled Condenser Coil

Condenser coils shall have all aluminum microchannel coils. All coils shall be leak tested at the factory to ensure pressure integrity. The condenser coil shall be pressure tested to 650 psig. Subcooling circuit(s) shall be provided as standard.

Air-Cooled Condenser Fans and Motors

All condenser fans shall be vertical discharge, direct drive fans, statically balanced, with aluminum blades and zinc plated steel hubs. Condenser fan motors shall be three-phase motors with permanently lubricated ball bearings, built-in current and thermal overload protection and weather-tight slingers over motor bearings.

Air Handling System

Supply Fan

Supply fan motors shall be open drip-proof. All supply fans shall be dynamically balanced in factory. Supply fan shall be test run in unit and shall reach rated rpm. All 60 Hz supply fan motors shall meet the Energy Independence Security Act of 2007 (EISA)All 50 Hz supply fan motors meet the U.S. Energy Policy Act of 1992 (EPACT).

20 to 75 Tons Air-Cooled with Forward Curved Supply Fan

Supply fans shall have two double-inlet, forward-curved fans mounted on a common shaft with fixed sheave drive. Fans shall be factory-tested to reach rated rpm before the fan shaft passes through first critical speed. Fan shaft shall be mounted on two grease lubricated ball bearings designed for 200,000 hours average life. Optional extended grease lines shall allow greasing of bearings from unit filter section. Fan motor and fan assembly shall be mounted on common base to allow consistent belt tension with no relative motion between fan and motor shafts. Entire assembly shall be completely isolated from unit and fan board by double deflection rubber-in-shear isolators, or by optional 2" deflection spring isolation.

20 to 75 Tons Air-Cooled with eDrive™ Direct-Drive Plenum Supply Fan

The eDrive™ direct drive plenum supply fan shall be [one][two] single width, single inlet 9-blade plenum fans. Fan blades shall be aluminum backward-inclined airfoil. Plenum fans shall be direct-driven. Entire assembly shall be completely isolated from unit and fan board by 2" deflection spring isolation. Multiple fan widths shall be available to optimize efficiency. Fan shall not require routine maintenance such as fan bearing lubrication, belt tensioning and replacement, sheave alignment, and setscrew torque checks.

90 to 130 Tons Air-Cooled

All supply fans shall have two independent fan assemblies with double inlet, air foil fan, motor and fixed pitch sheave drive. All fans shall be statically and dynamically balanced and tested in factory. Supply fans shall be test run in unit as part of unit test. Unit shall reach rated rpm before fan shaft passes through first critical speed. Fan shafts shall be mounted on two grease lubricated ball bearings designed for 200,000 hours average life.

Optional extended grease lines shall allow greasing of bearings from unit filter section. Fan motor and fan assembly shall be mounted on common base to allow consistent belt tension with no relative motion between fan and motor shafts. Entire assemblies shall be completely isolated from unit and fan board by two-inch deflection spring isolators.

System Control Options

Constant Volume Zone Temperature Control

Option shall provide all the necessary controls to operate rooftop from a zone sensor, including CV microprocessor unit control module, a microprocessor compressor controller and a unit mounted Human Interface Panel.

Constant Volume with Discharge Temperature Control

Option shall provide all the necessary controls to operate a CV rooftop with discharge air temperature control, including discharge air microprocessor controller and discharge air sensor. The microprocessor controller shall coordinate the economizer control and the stages of cooling with zone or outdoor air reset capabilities and an adjustable control band to fine-tune the control to specific applications.

Constant Volume Zone Temperature Control and Exhaust/Return Fan Variable Frequency Drives w/o Bypass (with Statitrac Only)

Option shall provide all the necessary controls to control/maintain building space pressure through a CV rooftop. The Variable Frequency Drive (VFD) shall modulate the speed of the exhaust/return fan motor in response to building pressure.

A differential pressure control system, called Statitrac, shall use a differential pressure transducer to compare indoor building pressure to atmospheric pressure. The VFD shall receive a 0-10 VDC signal from the unit microprocessor based upon the space static pressure and cause the drive to accelerate or decelerate as required to maintain the space pressure within the deadband.

Constant Volume Zone Temperature Control and Exhaust/Return Fan Variable Frequency Drives and Bypass (with Statitrac Only)

Bypass control shall provide full nominal airflow in the event of drive failure.

Variable Air Volume Discharge Temperature Control with Variable Frequency Drives without Bypass

Option shall provide all necessary controls to operate a VAV rooftop from the discharge air temperature, including discharge air microprocessor controller and discharge air sensor.

The microprocessor controller shall coordinate the economizer control and the stages of cooling with discharge air temperature reset capabilities. Option shall include factory installed and tested VFDs to provide supply fan motor speed modulation.

VFD shall receive 0-10 VDC from the unit microprocessor based upon supply static pressure and causes the drive to accelerate or decelerate as required to maintain the supply static pressure setpoint. Optional bypass control shall provide full nominal airflow in the event of drive failure.

Single Zone Variable Air Volume

Single zone VAV option shall provide all necessary controls to operate a rooftop unit based on maintaining two temperature setpoints; the discharge air and zone. Option shall include factory-installed variable frequency drive (VFD) to provide supply fan motor speed modulation. During Single Zone VAV cooling, the unit shall maintain zone cooling setpoint by modulating the supply fan speed more or less to meet zone load demand, and the unit shall maintain discharge

temperature to the discharge cooling setpoint by modulating economizer if available and staging DX cooling.

VAV Supply Air Temperature Control with Variable Frequency Drives and Bypass

Bypass control shall provide full nominal airflow in the event of drive failure.

Controls

Unit shall be completely factory wired with necessary control and contactor pressure lugs or terminal block for power wiring. Units shall provide an internal location for a non-fused disconnect with external handle for safety. Unit mounted microprocessor controls shall provide anti-short cycle timing for compressors to provide a high level of machine protection.

Unit Controller

DDC microprocessor controls shall be provided to control all unit functions. The control system shall be suitable to control CV or VAV applications. The controls shall be factory installed and mounted in the main control panel. All factory installed controls shall be fully commissioned (run tested) at the factory. The unit shall have a Human Interface Panel with a 16 key keypad, a 2 line X 40 character clear English display as standard to provide the operator with full adjustment and display of control data functions. The unit controls shall be used as a stand-alone controller, or as part of a building management system involving multiple units.

- The unit shall be equipped with a complete microprocessor control system. This system shall consist of temperature and pressure (thermistor and transducer) sensors, printed circuit boards (modules), and a unit mounted Human Interface Panel. Modules (boards) shall be individually replaceable for ease of service. All microprocessors, boards and sensors shall be factory mounted, wired and tested. The microprocessor boards shall be standalone DDC controls not dependent on communications with an on-site PC or a Building Management Network. The microprocessors shall be equipped with onboard diagnostics, indicating that all hardware, software and interconnected wiring are in proper operating condition. The modules (boards) shall be protected to prevent RFI and voltage transients from affecting the board circuits. All field wiring shall be terminated at separate, clearly marked terminal strip. Direct field wiring to the I/O boards is not acceptable. The microprocessor's memory shall be non-volatile EEPROM type requiring no battery or capacitive backup, while maintaining all data.
- Zone sensors shall be available in several combinations with selectable features depending on sensor.
- The Human Interface Panel keypad display character format shall be 40 characters x 2 lines. The character font shall be 5 x 7 dot matrix plus cursor. The display shall be Supertwist Liquid Crystal Display (LCD) with blue characters on a gray/green background which provides high visibility and ease of interface. The display format shall be in clear English. Two or three digit coded displays are not acceptable.
- The keypad shall be equipped with 16 individual touch-sensitive membrane key switches. The switches shall be divided into four separate sections and be password protected from change by unauthorized personnel. The six main menus shall be STATUS, SETPOINTS, DIAGNOSTICS, SETUP, CONFIGURATION and SERVICE MODE.

Filters

General

Filter options shall mount integral within unit and be accessible by hinged access panels.

Differential Pressure Gauge

A factory-installed, dial-type, differential pressure gauge shall be piped to both sides of the filter to indicate status. Gauge shall maintain a +/- 5 percent accuracy within operating temperature

limits of -20°F to 120°F. Gauge shall be flush-mounted with casing outer wall. Filter sections consisting of pre- and post-filters shall have a gauge for each.

No Filters Option (Two-inch throwaway filter rack only)

Shall provide a complete set of two-inch thick filter racks, without the filter media to accommodate applications which require field supplied filters.

No Filters Option (Bag/cartridge with pre-filter filter rack)

Shall provide a long-lasting galvanized steel frame without the filter media to accommodate applications which require field supplied filters.

Pre-Evaporator Filter Options (Available for all units)

Throwaway Filters, MERV 4

Filters shall be two-inch [50.8 mm] thick, UL Class 2, glass fiber type and rated at 80% average synthetic dust weight arrestment when tested in accordance with ASHRAE 52-76 and 52.1 test methods. Filters shall be mounted in galvanized steel rack.

Permanent Cleanable Wire Mesh Option, MERV 3

Shall be washable permanent wire mesh with metal frame.

High Efficiency Throwaway Option, MERV 8

Shall be two-inch high efficiency media filters with average dust spot efficiency of 25-35 percent and an average arrestance in excess of 90 percent when tested in accordance with ASHRAE 52-76.

90-95 Percent Bag Filter Option, MERV 14

Shall have glass fiber media mounted in a galvanized steel frame. These Class 1 single piece disposable bag filters shall have a 90-95% dust spot efficiency rating per ASHRAE 52-76. To ensure maximum bag filter life two-inch MERV 8 pre-filters shall be included with the bag filters.

90-95 Percent Cartridge Filter Option, MERV 14

Twelve-inch deep cartridge filters shall be mounted in a galvanized steel frame. Filters shall be Class 1 listed by Underwriters Laboratories and have a 90-95% dust spot efficiency per ASHRAE 52-76. To ensure maximum cartridge filter life, two-inch MERV 8 pre-filters shall be provided.

Final Filter Options (Available for SX Units only)

Final filter section filter options shall mount integral within the blank section unit casing and be accessible by hinged access doors.

90-95 Percent, Cartridge, Final Filter Option, Merv 14

Available on cooling only SX units. Twelve-inch deep cartridge filters shall be mounted in a galvanized steel frame. Filters shall be Class 1 listed by Underwriters Laboratories and have a 90-95% dust spot efficiency per ASHRAE 52-76.

90-95 Percent, Cartridge Filter with two-inch pre-filters, Final Filter Option, MERV 14

Available on cooling only SX units. 2", MERV 8 pre-filters shall be included with the cartridge filters. Pre-filters shall be mounted in the same galvanized steel frame as the cartridge final filters.

Exhaust Air

General

Return air options shall include no relief, barometric relief, 50 percent exhaust fan, 100 percent modulating exhaust fan and 100 percent modulating exhaust fan with direct space building pressurization control. Exhaust motors shall be open drip-proof fan cooled. All 60 Hz motors

meet the Energy Independence and Security Act of 2007 (EISA). All 50 Hz exhaust motors meet the U.S. Energy Policy Act of 1992 (EPACT).

No Relief (standard)

Rooftops can be built for makeup air applications with no exhaust. Relief air opening shall be sealed with panel and made watertight.

Barometric Relief Option

Gravity dampers shall open to relieve positive pressure in the return air section of the rooftop. Barometric relief dampers shall relieve building overpressurization, when that overpressurization is great enough to overcome the return duct pressure drops.

50 percent Exhaust Fan Option

One, double inlet, forward-curved fan shall be mounted rigidly to base with fixed sheave drive. Fan shall be dynamically balanced and tested in factory. Unit shall reach rated rpm before fan shaft passes through first critical speed. Fan shaft shall be mounted on two grease lubricated ball bearings designed for 200,000 hours average life. Optional extended grease lines shall allow greasing of bearings from unit filter section. Barometric dampers at fan outlet shall prevent air backdraft. Fifty percent exhaust fan shall be an on/off control based on economizer OA damper position.

Modulating 100 Percent Exhaust Fan Option

Two, double-inlet, forward-curved fans shall be mounted on a common shaft with fixed sheave drive. All fans shall be dynamically balanced and tested in factory before being installed in unit. Exhaust fan shall be test run in unit as part of unit test. Unit shall reach rated rpm before fan shaft passes through first critical speed. Fan shaft shall be mounted on two grease lubricated ball bearings designed for 200,000-hour average life.

Optional extended grease lines shall be provided to allow greasing of bearings from unit filter section. Fan motor and assembly shall be mounted on common base to allow consistent belt tension with no relative motion between fan and motor shafts. On motor sizes larger than five hp entire assembly shall be completely isolated from unit and fan board by double deflection, rubber in shear isolators or spring isolation. Discharge dampers at unit outlet shall modulate exhaust airflow in response to OA damper position.

Modulating 100 Percent Exhaust Fan with Statitrac™ Control Option

Two, double-inlet, forward-curved fans shall be mounted on a common shaft with fixed sheave drive. All fans shall be dynamically balanced and tested in factory before being installed in unit. Exhaust fan shall be test run as part of unit final run test. Unit shall reach rated rpm before fan shaft passes through first critical speed. Fan shaft shall be mounted on two grease lubricated ball bearings designed for 200,000-hour average life.

Optional extended grease lines shall be provided to allow greasing of bearings from unit filter section. Fan motor and assembly shall be mounted on common base to allow consistent belt tension with no relative motion between fan and motor shafts. Entire assembly shall be completely isolated from unit and fan board by double deflection, rubber in shear isolators or spring isolation on motor sizes larger than five hp.

For both CV and VAV rooftops, the 100 percent modulating exhaust discharge dampers (or VFD) shall be modulated in response to building pressure. A differential pressure control system, (Statitrac™), shall use a differential pressure transducer to compare indoor building pressure to outdoor ambient atmospheric pressure. The FC exhaust fan shall be turned on when required to lower building static pressure setpoint.

The (Statitrac™) control system shall then modulate the discharge dampers (or VFD) to control the building pressure to within the adjustable, specified dead band that shall be adjustable at the human interface panel.

Return Air

General

Return air options shall include 100 percent modulating return fan and 100 percent modulating return with direct space building pressurization control. All 60 Hz motors meet the Energy Independence and Security Act of 2007 (EISA). All 50 Hz exhaust motors meet the U.S. Energy Policy Act of 1992 (EPACT).

100 Percent Modulating Return Fan

A single width plenum fan with airfoil blade shall be mounted on a shaft with fixed sheave drive. The fan shall be dynamically balanced for the operating envelop and tested in factory before being installed in unit. The plenum fan shall be test run in unit as part of unit test. Fan operating envelop rpm shall be below first critical speed.

Fan shaft shall be mounted on two grease lubricated ball or roller bearings designed for 200,000-hour average life. Extended grease lines shall be provided to allow greasing of bearings from section base rail. Fan motor and assembly shall be mounted on common base to allow consistent belt tension with no relative motion between fan and motor shafts. The entire assembly shall be completely isolated from unit with 2-inch spring isolators. Discharge dampers at unit outlet shall modulate relief airflow in response to OA / return air damper position.

A single width plenum fan with airfoil blade can relieve up to 100 percent supply air. The fan operates in conjunction with the supply fan. The relief damper modulates in response to economizer damper position on constant volume rooftops.

100 Percent Modulating Return Fan with Statitrac™ Control Option

A single width plenum fan with airfoil blade shall be mounted on a shaft with fixed sheave drive. The fan shall be dynamically balanced for the operating envelop and tested in factory before being installed in unit. The plenum fan shall be test run as part of unit final run test. Fan operating envelop rpm shall be below first critical speed.

Fan shaft shall be mounted on two grease lubricated ball or roller bearings designed for 200,000-hour average life. Extended grease lines shall be provided to allow greasing of bearings from section base rail. Fan motor and assembly shall be mounted on common base to allow consistent belt tension with no relative motion between fan and motor shafts. The entire assembly shall be completely isolated from unit with 2-inch spring isolators.

Option shall be provided with all the necessary controls to control/ maintain building space pressure through a VAV rooftop. The variable frequency drive (VFD) modulates the speed of the return fan motor in response to return plenum pressure. The 100 percent modulating relief damper shall be modulated in response to building pressure. A differential pressure control system, (Statitrac), shall use a differential pressure transducer to compare indoor building pressure to outdoor ambient atmospheric pressure. The (Statitrac) control system shall modulate the dampers to control the building pressure to within the adjustable, specified deadband that shall be adjustable at the human interface panel. The return fan shall modulate in response to return plenum static pressure. Optional bypass control provides full nominal airflow in the event of drive failure.

Outside Air

General

Three outside air options: 100 percent return air, 0 to 25 percent manually controlled outside air, and 0-100 percent fully modulating economizer.

Manual Outside Air Option

Manually controlled outside air damper shall provide up to 25 percent outside air. Manual outside air damper shall be set at desired position at unit start-up.

0-100 Percent Modulating Economizer Option

Operated through the primary temperature controls to automatically utilize outside air for “free” cooling. Automatically modulated return and outside air dampers shall maintain proper temperature in the conditioned space. Economizer shall be equipped with an automatic lockout when the outdoor high ambient temperature is too high for proper cooling.

Minimum position control shall be standard and adjustable at the human interface panel or with a remote potentiometer or through the building management system. A spring return motor shall ensure closure of OA dampers during unit shutdown or power interruption. Mechanical cooling shall be available to aid the economizer mode at any ambient. Standard economizer dampers leakage rate shall be 2.5 percent of nominal airflow (400 cfm/ton) at 1 inch wg. static pressure.

Low-Leak Economizer Dampers Option

Low leak dampers shall be provided with chlorinated polyvinyl chloride gasketing added to the damper blades and rolled stainless steel jamb seals to the sides of the damper assembly. Low leak economizer dampers shall have a leakage rate of one percent based on testing data completed in accordance with AMCA Standard 500 at AMCA Laboratories.

Ultra Low-Leak Economizer Dampers Option

Economizer return and outside air dampers shall be provided with horizontal airfoil blades and spring-return actuators. The economizer shall have a functional life of 60,000 opening and closing cycles. Dampers shallbe AMCA 511 Class 1A certified with a maximum leakage rate of 3 CFM/sq-ft at 1.0 in WC pressure differential thus exceeding requirements of ASHRAE 90.1-2013, California Title 24-2013, and IECC-2012.

IntelliPak® units ordered with ultra low leak economizers shall be listed on the California Energy Commission Registry for factory compliance with Title 24 Economizer and FDD requirements. A label shall be applied to the unit identifying construction with the ultra low leak economizer and FDD controls.

Ultra low leak motorized exhaust dampers shall be provided when the ultra low leak economizer is ordered with an exhaust/return option that includes motorized dampers. Ultra low leak motorized exhaust dampers shall be AMCA 511 Class 1A certified with a maximum leakage rate of 3 cfm/sq-ft at 1.0 in WC pressure differential. This exceeds the most stringent requirements of ASHRAE 90.1 and IECC (4 CFM/sq-ft at 1.0 in WC pressure differential).

Economizer Control with Comparative Enthalpy

Two enthalpy sensors shall be provided to compare total heat content of the indoor air and outdoor air to determine the most efficient air source when economizing.

Economizer Control with Reference Enthalpy

An outdoor enthalpy sensor shall be provided to compare the total heat content of outdoor air to a locally adjustable setpoint. The setpoint shall be programmed at the human interface, or remote human interface, to determine if the outdoor enthalpy condition is suitable for economizer operation.

Economizer Control with Dry Bulb

An outdoor temperature sensor shall be included for comparing the outdoor dry bulb temperature to a locally adjustable temperature setpoint. The setpoint shall be programmed at the human interface, or remote human interface, to determine if outdoor air temperature is suitable for economizer operation.

Outside Air Measurement (Traq™)

A factory mounted airflow measurement station (Traq™) shall be provided in the outside air opening to measure airflow. The airflow measurement station shall measure from 40 CFM/ton to maximum airflow. The airflow measurement station shall adjust for temperature variations. Measurement accuracy shall meet requirements of LEED IE Q Credit 1 as defined by ASHRAE 62.1-2007.

Demand Control Ventilation

When equipped with a CO_2 sensor and (VCM) module, the fresh air damper position shall modulate in response to a CO_2 sensor in the conditioned space, in order to minimize the unit energy consumption and simultaneously meet the ventilation requirements of ASHRAE Std 62.1. The Traq™ airflow monitoring solution shall augment the system, allowing for measurement and control of outside airflow.

Heating System

Electric Heating Option

All electric heat models shall be completely assembled and have wired electric heating system integral within the rooftop unit. Heavy duty nickel chromium elements internally wired with a maximum density of 40 watts per square inch shall be provided. Heater circuits shall be 48 amps or less, each individually fused. Automatic reset high limit control shall operate through heater primary contactors and a manual reset high limit control, located in the electric heat control box, shall operate through heater backup contactors.

The 460 and 575 volt electric units shall have optional factory mounted non-fused disconnect switch located in the main control panel to serve the entire unit.

The 200 and 230 volt SEHL models shall have separate power supply to heating section.

Steam Heating Option

Steam coils shall be Type NS, with non-freeze steam distribution circuits. Distributor tubes shall be located concentrically within condensing tubes to assure even steam distribution. Coils shall be pitched to provide complete drainage. Steam modulating valve with actuator shall be provided.

Hot Water Heating Option

Hot water coils shall be Type 5W and factory mounted in the rooftop unit to provide complete drainage of coil. Hot water modulating valve with actuator shall be provided.

Gas-Fired Heating Option

All gas-fired units shall be completely assembled, have a wired, gas-fired heating system integral within unit, and fire tested prior to shipment. Units shall be cULus approved specifically for outdoor applications downstream from refrigerant cooling coils.

All gas piping shall be threaded connection with a pipe cap provided. Gas supply connection shall be provided through the side or bottom of unit.

Heat exchangers shall be tubular two pass design with stainless steel primary and secondary surfaces. Direct spark ignition shall be provided. Free floating design shall eliminate expansion and contraction stresses and noises. Gasketed cleanout plate shall be provided for cleaning of tubes/turbulators.

Heat exchanger shall be factory pressure and leak tested.

Burner shall be a stainless steel industrial type with an air proving switch to prevent burner operation if the burner is open for maintenance or inspection. Staged and full modulating burners have a ceramic cone that shapes the flame to prevent impingement on sides of heat exchanger drum. Ultra modulating burner assembly shall house ignition and monitoring electrode.

Combustion blower shall be centrifugal type fan to provide air required for combustion. Fan motor shall have built-in thermal overload protection.

Gas safety controls shall include electronic flame safety controls to require proving of combustion air prior to ignition sequence which shall include a pre-purge cycle. Direct spark ignition shall be provided on 235 and 350 MBh heat exchangers and pilot ignition shall be provided on 500, 850 and 1000 MBh heat exchanger units. Sixty second delay shall be provided between first and second stage gas valve operation on two-stage heaters. Continuous electronic flame supervision shall be provided as standard.

4 to 1 and ultra modulating gas heaters shall be made from grades of stainless steel suitable for condensing situations. The 4 to 1 modulating heater shall have turn down ratios of 4 to 1 for all heat inputs. The ultra modulating turn down ratios will have 14 to 1 for 500MBh, 18 to 1 for 850MBh, and 21 to 1 for 1000MBh.

Miscellaneous Options

- Ambient Control — Low ambient dampers shall be provided on condenser fan to allow the unit to operate down to 0°F (20-75 ton).
- Supply Airflow Measurement (Piezometer) — Plenum supply fan shall have an airflow measurement device to measure differential pressure and to calculate fan airflow. The device shall be capable of measuring airflow within ± 5 percent total accuracy when operating within the stable operating region of the fan curve. Fan airflow performance and noise levels shall not be affected by the installation of the device. The fan inlet shall not be obstructed by the airflow measurement device.
- IntelliPak™ Replacement Unit (IRU) — The IntelliPak™ replacement solution shall include a condenser base pan, strengthening of the condenser section with welded reinforcement of condenser base rail, as well as welded integral supports to the condenser base. This additional strength shall allow the reuse of the existing pedestal as well as any Trane® full perimeter curb and reduce installation risk and labor. Also optional with stainless steel.
- Non-Fused Disconnect Switch with External Handle — External handle shall enable the operator to disconnect unit power with the control box door closed for safety.
- Hot Gas Bypass — Valve, piping and controls shall all be included on circuit 2 to allow operation at low airflow, avoiding coil frosting and damage to compressor. When suction pressure falls below valve adjustable setpoint, the valve shall modulate hot gas to the inlet of the evaporator.
- Modulating Hot Gas Reheat Control (available on S_HL units, air-cooled condenser only) — A reheat condenser coil shall be factory installed downstream of the unit evaporator coil. Modulating valves shall control the flow of refrigerant between the indoor reheat and outdoor condensers in response to the unit discharge air temperature in order to dehumidify the space. The modulating valve shall always apply to circuit 1.
- Rapid Restart — Option shall provide immediate start-up upon power failure. A backup generator is required on site before unit start-up. Rapid restart will begin immediately after recovery from a power loss and work by restarting the compressors and supply fan quickly, providing full cooling within two to three minutes.
- High Duct Temperature Thermostats — Option shall consist of two manual reset thermostats, one located in the discharge section of the unit set at 240°F and the other in the return section set at 135°F. The rooftop shall shut down if the thermostats are tripped.
- High Efficiency Units (20-75 ton) — Unit shall meet ASHRAE 189.1-2011 and CEE Tier 2 Commercial Unitary AC and HP Specification for utility rebate requirements.
- High Capacity Units— Units shall be made high capacity through the use of larger compressors that provide higher refrigerant mass flow rates.
- High Fault Unit Interrupt Rating (Short Circuit Current Rating-SCCR) — An optional 65,000 Amp rating (up to 480V) and 25,000 Amp rating (600V) shall be applied to the unit enclosure using a non-fused circuit breaker for disconnect switch purposes. Fan motors, compressors, and electric heat circuits shall be provided with protective devices that will provide the elevated level of fault protection.The unit shall be marked with approved cULus markings and will adhere to cULus regulations.
- Stainless Steel Drain Pan — The double sloping stainless steel drain pan shall promote runoff of standing water from condensation inside the unit. Two drain pipes shall be installed through the base channel on each side of the unit. The evaporator drain pan shall be constructed of 14 gauge stainless steel. On units 40 tons and larger, the intermediate drain pan shall be constructed of 16 gauge stainless steel. This shall provide protection in corrosive environments.
- Corrosion Protected Condenser Coil — All aluminum micro-channel condenser coil protection shall consist of a corrosion resistant coating that shall withstand ASTM B117 Salt Spray test

for 6,000 hours and ASTM G85 A2 Cyclic Acidified Salt Fog test for 2,400 hours. This coating shall be added after coil construction covering all tubes, headers and fin edges, therefore providing optimum protection in more corrosive environments.

- High Capacity Evaporator Coil — Additional rows of coil and enhanced evaporator tube surfaces shall provide increased capacity compared to standard coils. (90 and 105 ton)
- High Efficiency Condenser Coil — Additional rows of coil shall provide increased efficiency compared to standard coils. (90 ton)
- Internal Shaft Grounding Ring — Motors shall have internal bearing protection for use with VFDs to provide a conductive discharge path away from the motor bearings to ground. Bearing Protection Rings shall be circumferential rings with conductive micro fibers which provide the path of least resistance and dramatically extend motor life.
- Generic Building Automation System Module (GBAS 0-5 VDC) — Shall be available for those cases where non-Tracer® building management system is used. The GBAS module shall provide a binary input for Demand Limiting, four (4) analog inputs for setpoint adjustment and five (5) relay outputs for diagnostic reporting. Inputs shall use a potentiometer or 0-5 VDC signal.
- Generic Building Automation System Module (GBAS 0-10 VDC) — Option shall provide broad control capabilities for building automation systems other than Trane's Tracer® system. The GBAS module shall provide a binary input for Demand Limiting, four (4) analog inputs for setpoint adjustment and four (4) analog outputs as well as one (1) relay output for diagnostic reporting. Inputs shall use a potentiometer or 0-10 VDC signal.
- Remote Human Interface Panel (RHI) — Remote human interface panel shall perform all the same functions as unit-mounted human interface panel, except for the Service Mode. Up to 4 rooftop units shall be monitored and controlled with a single remote human interface panel. Option shall include features such as a 2 line x 40 character-clear, English display, a red LED light to indicate an alarm condition (alarm also shown on the two line display), a 16–key keypad that is used in conjunction with the display to prompt the infrequent user when making desired changes, and a hinged door to make the RHI suitable for mounting on any wall. The RHI can be mounted inside a building, up to 5,000 feet from the unit. The RHI shall be wired to the IPCB mounted in the rooftop with twisted wire pair communication wiring and 24V control wiring.
- Ventilation Override Module (VOM) — Option shall be programmed to transition to up to 5 different programmed sequences for Smoke Purge, Evacuation, Pressurization, Purge, Purge with duct control sequence and Unit off. The transition shall occur when a binary input on the VOM is closed (shorted); this would typically be a hard wired relay output from a smoke detector or fire control panel
- Extended Grease Lines— Lines shall allow greasing of supply and exhaust fan bearings through the filter access door.
- Access Doors — Hinged access doors shall provide easy access to supply fan, filters, exhaust/return fan, and the heating section. These access doors shall feature double wall construction with dual density insulation sandwiched between heavy gauge galvanized steel panels for strength and durability.
- Inter-Processor Communication Bridge (IPCB) — This module shall provide an amplified and filtered version of the IPC link for connection to a remote human interface panel. Each rooftop that is tied into a remote human interface panel shall have a IPCB installed.
- Trane® Communication Interface Module — Shall provide interface to Trane's Integrated Comfort system (ICS), which allows control and monitoring of the rooftop by a Tracer® building management system.
- Tracer® LonTalk® Communication Interface Module — Shall provide control and monitoring of the rooftop by Tracer® or to a 3rd party building management system utilizing LonTalk® protocol.
- BACnet® Communication Interface Module — Shall provide control and monitoring of the rooftop by Tracer® SC or a 3rd party building management system utilizing BACnet® protocol.

- GFI Convenience Outlet (Factory Powered) — A 15A, 115V Ground Fault Interrupter convenience outlet shall be factory installed. It shall be wired and powered from a factory mounted transformer. Unit-mounted, non-fused disconnect with external handle shall be furnished with factory powered outlet.
- Two-Inch Spring Isolators — Supply and exhaust/return fan (if applicable) assemblies shall be isolated with two-inch nominal deflection to reduce transmission of vibrations (standard feature on 90 to 130 tons).
- Special Unit Paint Colors — Shall allow matching of HVAC equipment to customer specified color. This option shall be for standard paint compound in different colors only.

Accessories

Roof Mounting Curb

Roof mounting curb shall be heavy gauge zinc coated steel with nominal two-inch by four-inch nailer setup. Supply/return air opening gasketing shall be provided. Curb shall ship knocked down for easy assembly. Channel shall be provided to allow for adjustment of return air opening location. Curb shall be manufactured to National Roofing Contractors Association guidelines.

Electronic Zone Sensors

- Zone Sensor shall provide two temperature setpoint levers, Heat, Auto, Off, or Cool system switch, Fan Auto or Fan On switch. Optional status indication LED lights, System On, Heat, Cool, and Service shall be available. This sensor shall be used with CV and SZVAV units.
- Programmable Night Setback Sensor shall be electronic programmable with auto or manual changeover with 7 day programming. Keyboard shall provide selection of Heat, Cool, Fan Auto or On. All programmable sensors shall have System On, Heat, Cool, Service LED/ indicators as standard. Night setback sensors shall have (1) Occupied, (1) Unoccupied and (1) Override program per day. Sensors shall be available for CV zone temperature control and VAV Supply Air temperature control.
- Discharge Temperature Control sensor shall be provided with supply air single temperature setpoint and AUTO/OFF system switch. Status indication LED lights shall include: System On, Heat, Cool and Service. Sensor shall be provided for zone temperature control for daytime warm-up heat mode.
- Remote Sensor shall be available to be used for remote zone temperature sensing capabilities when zone sensors are used as Remote panels.
- Fast Warm-Up Sensor shall be used as Morning warm-up sensor with VAV units.
- Integrated Comfort System sensors shall be available with sensor only, sensor with timed override, and sensor with local temperature setpoint adjustment with timed override.
- Remote Minimum Position Potentiometer shall be available to remotely adjust the minimum position setting of the unit economizer.
- Humidity Sensor - Monitors the humidity levels in the space for 1) Humidification and/or 2) Modulating Hot Gas Reheat.
- Temperature Sensor - bullet or pencil type sensor that could be used for temperature input such as return air duct temperature.

Field-Installed Kits

- Trane® Communication Interface/Interprocessor Communication Bridge kit and Remote Human Interface kit - For future opportunities and upgrade flexibility, two factory provided hardware kits are available. The Trane® Communication Interface (TCI) module is required for communication with Tracer®. Included in this kit is an Interprocessor Communicating Bridge (IPCB) module which is required for communication with a remote human interface panel.
- Remote Human Interface Panel kit - This kit can control up to four rooftops. The remote human interface panel has all the features of the unit-mounted human interface panel, except no service mode interface is allowed remotely for safety reasons. All other modules and their required hardware are available through the Trane® service parts organization.

- Trane® LonTalk® Communication Interface kit - For future opportunities and upgrade flexibility, this kit contains a LonTalk® Communication Interface (LCI-I) module, which is required for communication with Tracer® Summit or a 3rd party building automation system.
- Trane® BACnet® Communication Interface kit - For future opportunities and upgrade flexibility, this kit contains a BACnet® Communication Interface (BCI-I) module, which is required for communication with Tracer® SC or a 3rd party building automation system
- Trane® Air-Fi® Wireless Communications Interface (Field Installed) — Trane® Air-Fi Wireless Communications Interface (WCI) provides wireless communication between the Tracer® SC, Tracer® Unit Controllers, and BACnet® Communication Interface (BCI) modules.

  Note: *BCI required for operation*

Certified AHRI Performance

Packaged Rooftop units cooling, heating capacities and efficiencies shall be rated within the scope of the Air-Conditioning, Heating & Refrigeration Institute (AHRI) Certification Program and display the AHRI Certified® mark as a visual confirmation of conformance to the certification sections of AHRI Standard 340-360 (I-P) and ANSIZ21.47 and 10 CFR Part 431 pertaining to Commercial Warm Air Furnaces. The applications in this catalog specifically excluded from the AHRI certification program are:

- Ventilation modes
- Heat Recovery
- Units larger than nominal 63 tons
- Evaporative Condensers

Notes

The AHRI Certified mark indicates Trane U.S. Inc. participation in the AHRI Certification program. For verification of individual certified products, go to ahridirectory.org.

Trane - by Trane Technologies (NYSE: TT), a global innovator - creates comfortable, energy efficient indoor environments for commercial and residential applications. For more information, please visit trane.com or tranetechnologies.com.

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